

# QST

June, 1935

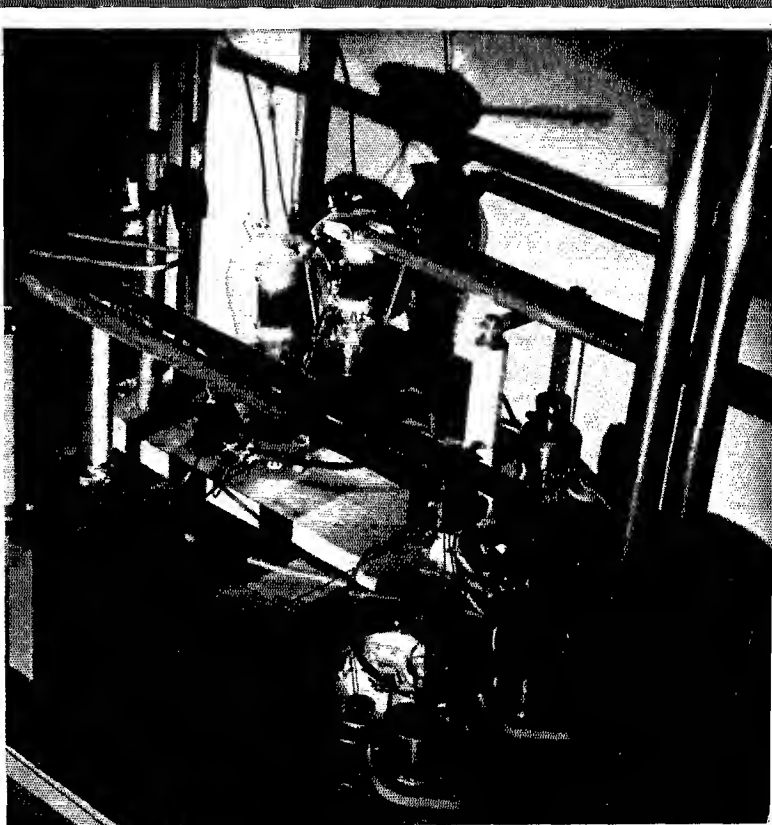
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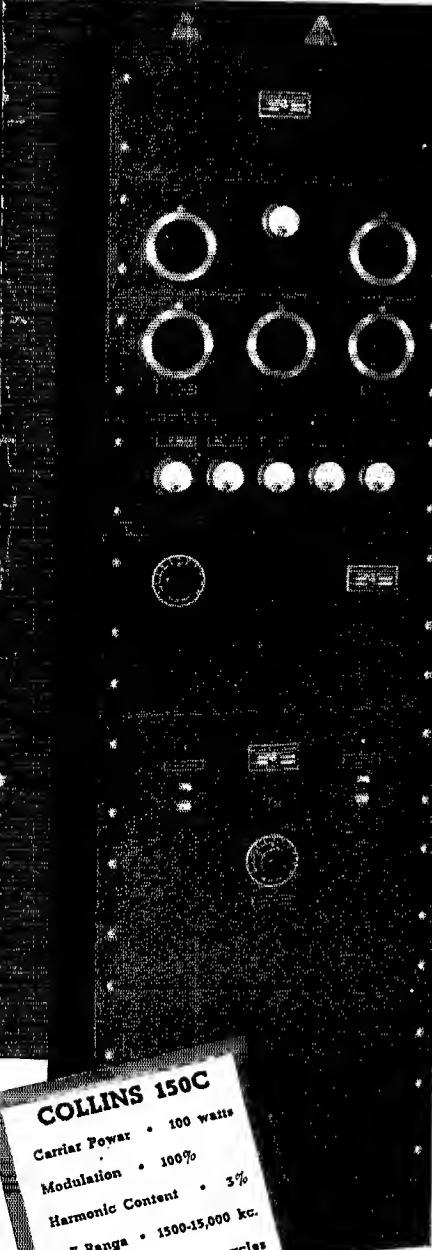
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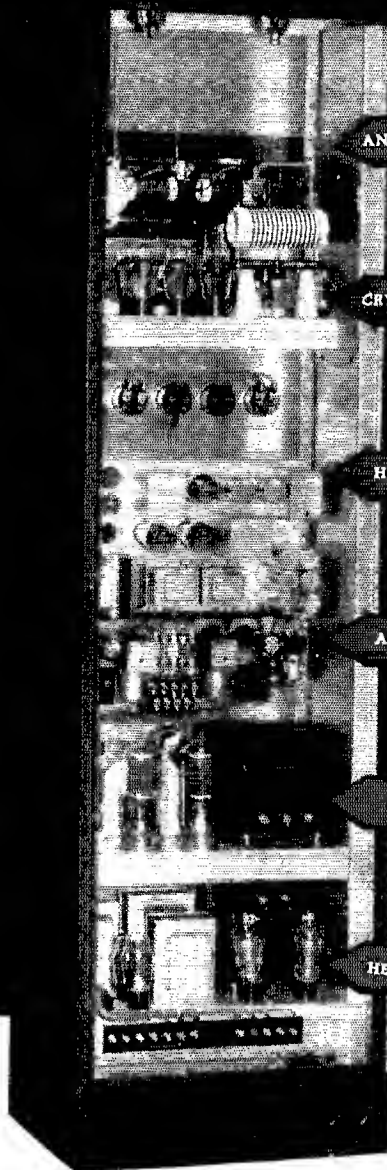


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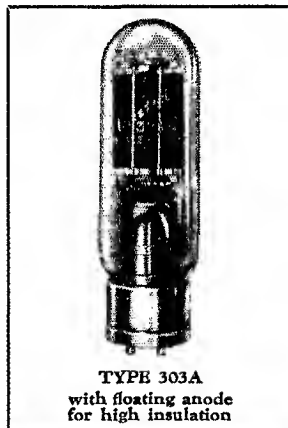
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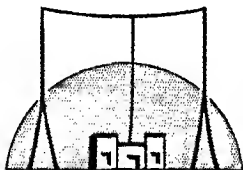
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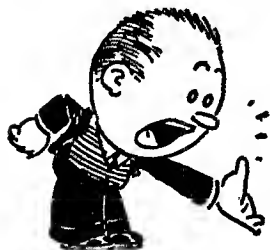
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## devoted entirely to AMATEUR RADIO

Editorials	7
Stratosphere Balloon Radio Tests	8
Hudson Division Convention	8
A Complete 20-Watt Phone Operating on 110-Volt D.C. Mains <i>P. L. Spencer, W1GBE and R. M. Purinton, W2ICU</i>	9
Air-Mass Conditions and the Bending of Ultra-High Frequency Waves <i>Ross A. Hull</i>	13
Why Does Automatic Bias Bias? <i>W. B. Girkin</i>	19
Coming Examinations for Amateur Operator License	19
Technical Topics	21
Third Annual A.R.R.L. Field Day Contest	22
A New Hot Cathode Gaseous Discharge Amplifier and Oscillator <i>J. R. Nelson and James LeVan</i>	23
Hamdom	26
A New 100-Watt Type Zero Bias Transmitting Tube	27
A Portable Receiver That Delivers the Goods <i>Floyd L. Vanderpoel, W1WR</i>	28
Trunk Line "C" <i>James M. Bruning, W3EZ</i>	30
Michigan State Convention	31
A.R.R.L. Copying Bee	32
What the League is Doing	33
Experimenters' Section	
PHONE MONITOR—TIME DELAY RELAY USING A 45 TUBE—TYPE 59 TUBE AS AN INVERTED AMPLIFIER—USING A VOLTMETER AS AN OHMMETER —RAISING A SECTIONALIZED MAST—INEXPENSIVE FUSES—FIELD STRENGTH METER	41
Amateur Radio Stations	44
Operating Notes	45
I.A.R.U. News	57
VK Contest Results	58
Correspondence Department	59
Silent Keys	86
A.R.R.L. QSL Bureaus	86
Book Review	88
New England Division Convention	92
Circulation Statement	96
A New Type Crystal Microphone	96
Standard Frequency Transmissions	98
Schedules for WWV	98
Hamads	99
QST's Index of Advertisers	102

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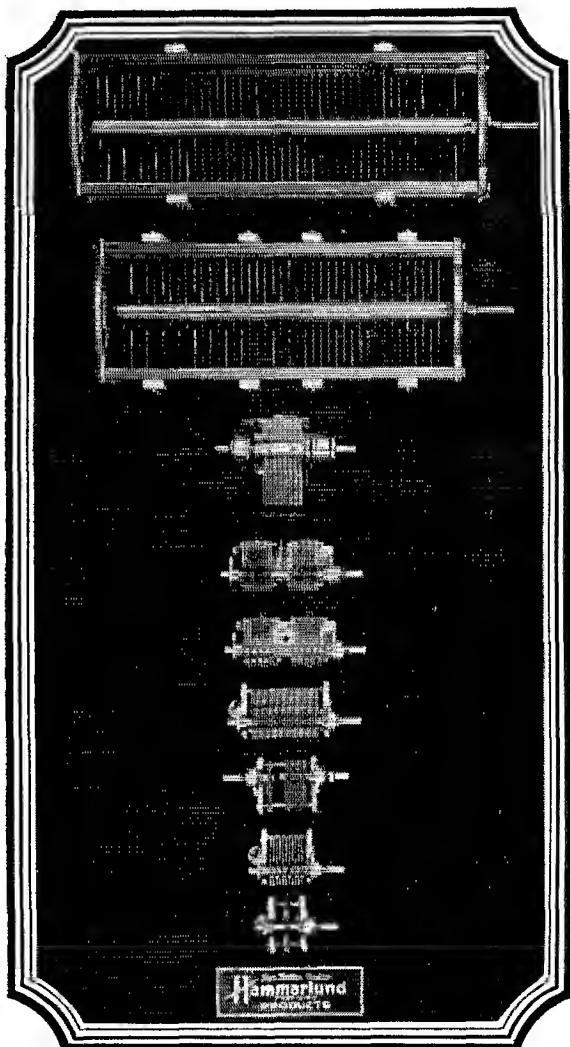
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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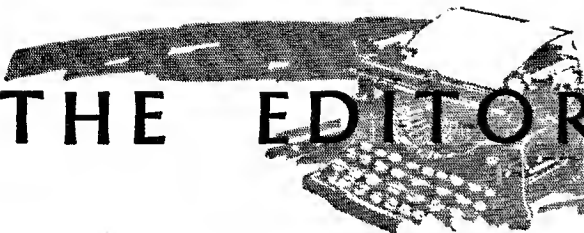
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# THE EDITOR'S MILL

WE WOULD not like to be misunderstood as saying that there is not bad interference in the amateur bands. It's fierce. But we cannot agree with those who suggest that it is just so tough that it is impossible to do any work. The fellows who say that are thinking back to the days when bands were wider and the number of amateurs less, yet, singularly enough, in almost every case these remarks come from fellows who did not themselves operate under the golden conditions aforesaid and who did not have speaking acquaintance with broad and unstable signals and ancient receivers. If they had, and if their memory had stuck with them, they would know that our operating conditions to-day with a single-signal receiver are just about as good as they ever were, despite our growth in numbers. It is true that an unstable signal has an impossible job of it but the proprietor of a c.w. signal of good quality can still do about as much work as he wants.

It seems to us that it almost boils down to this: With a receiver that does not possess the single-signal feature one may get enjoyable operating by working the loudest stations or the ones that are relatively in the clear, but with the aid of a single-signal receiver almost anybody can be worked. In recent months we have been using at our home station the original model of the 5-tube single-signal receiver described in our issue for April of 1933. It doesn't use a crystal filter; it employs regeneration in its one i.f. stage to obtain the single-signal effect and actually was rebuilt from a 3-tube autodyne. We have had some interesting experiences with this receiver in the 7-megacycle band. A few nights ago we worked a W9 in Wisconsin for an hour and three-quarters through the busiest part of the evening, and copied him solid. His input was 110 watts. It was a coolish evening and in the house next door an invalid lady had gone to bed with a heating pad. The miserable thing (the pad) had a defective thermostat which was letting fly a raucous noise every alternate second. Not twenty feet from the end of our receiving antenna, it made an R9 rumpus over the whole tuner—without the sniggle-snooper. Simply by cranking up the boondoggle, the signals poked their heads above the noise and work was readily possible that would have been absolutely unbelievable with an autodyne receiver or an ordinary superhet. Just to prove that there was nothing freakish about this we turned around and

worked a W4 in Tennessee for a solid hour, solid copy, through the same racket. On another evening we were listening to the splendid signal which the well-known CT2BK generates with an input of only 20 watts on 7000 kc. About 2000 feet from our location another member of the QST staff has a juicy transmitter with an input of 800 watts to the final. When he opened up on a frequency differing from CT2BK's by but 3 kc. we were ourselves amazed to discover that we could still copy almost all of the latter. Twenty watts 2000 miles away in the Azores, 800 watts 2000 feet away, frequency difference 3 kc.! Without sniggling there wasn't a smell of him. Through this same local interference we have successfully kept schedules with a comparable station in Chicago having a frequency difference of only about 900 cycles. The regenerative S.S. receiver under these extreme circumstances does not by any means eliminate the interfering signal but it holds it down, prevents it from plugging up the receiver, and enables the trained ear of the c.w. man to complete a job that otherwise would be completely hopeless. It is of course well known that the crystal S.S. receiver at maximum selectivity is capable of beautiful discrimination between signals of comparable strength if they differ in frequency by even as little as a few hundred cycles.

For 'phone work the S.S. with variable selectivity is similarly a boon. Accepting only so much of the signal as is essential for intelligibility, it rejects the rest and provides communication under conditions where a "high-quality" receiver yields its owner only a sick headache. It is simply not understandable that in the highly-congested 'phone bands most of the 'phone men do not use selective receivers but still cling to types designed for broadcast reception.

We badly need more room. We shouldn't have to operate under such great congestion that only super tuners enable satisfactory work. But while conditions are what they are, we ought to take fullest advantage of technological aids. The Singlo-Signal receiver is QST's chief contribution to the modern attack on QRM. Apparently not every amateur is able to learn to operate a S.S. receiver properly. Not everyone can afford to buy one of the many manufactured versions. But the regenerative model in particular is inexpensive and can be built at home. We don't believe that this little receiver is properly appreciated. With a

little experience it will do really marvelous things by comparison with the straight superhets and autodynes.

With that selectivity and the trained ear and sense of adjustment upon which the radio amateur prides himself, almost anything is possible. Some of us have been radio amateurs for twenty-five years or more and have worked through every phase of the changing QRM problem. We must admit that in the days of kilowatt synes and Paragon regenerators, each the last word in its

field, no such work was possible as to-day; interference made it wholly impracticable. The same thing was true in the c.w. days of 1928 for, despite the wider bands, QRM got the better of our unstable sigs, poor notes and unselective receivers. To-day with a S.S. receiver we can work more stations in an evening or work one station a longer period of time, keep more schedules or raise more desired stations—do more desired things rather than random things—than ever before in the history of amateur radio. K. B. W.

## Stratosphere Balloon Radio Tests

UNDER the auspices of the National Geographic Society and the Army Air Corps, preparations are being made for a stratosphere balloon flight shortly after June 1st. Capt. A. W. Stevens, who participated in last year's flight, will be in charge, and Lyman J. Briggs, Director, Bureau of Standards, Department of Commerce, Washington, is chairman of the Advisory Committee. Besides a separate radio transmitter for communication purposes, the balloon will carry *two ultra-high frequency transmitters*, which will send out signals continuously for the sole purpose of observation and measurement at various distances. The flight should give a unique opportunity to observe the transmission characteristics of these frequencies from unusually great altitudes.

The transmitters, with vertical doublet antennas, will be suspended below the gondola. The frequencies will be 55.0 and 108 mc. just below the low frequency edge of the band. A 1000 cycle continuous tone modulation will be used, to facilitate reception without use of an oscillator in the receiving set. From the ceiling, it is planned to drop the u.h.f. transmitters by parachute. It is important that each observer make his measurements during as much of the time as possible that the transmitters are in operation. The following information would be desirable from stations succeeding in receiving the balloon signals.

- (a) Location of receiver.
- (b) Description of receiver and antenna used.
- (c) Intensity of signal received at five minute intervals or oftener.
- (d) Noise level.
- (e) Fading of signal noted.
- (f) Any other phenomena or matters of interest.

A matter of some concern is the question of interference by super-regenerative receivers tuned to the balloon transmitter frequencies. Several official receiving stations will operate utilizing sensitive superheterodyne receivers and A.R.R.L. is going to call on its affiliated clubs and Section organization in North Dakota to establish *guard zones* of about a ten-mile radius about these

receiving stations as soon as their location is known within which distance observers will refrain from reception of 55 and 108 mc. Also amateurs are earnestly requested to refrain from transmitting on neighboring frequencies through the period of the flight to avoid possible difficulties or interference with the official records, which could not be duplicated.

The balloon will take off from the vicinity of Rapid City, South Dakota, probably in the early morning, and is expected to drift southeast, reaching its maximum altitude about noon in the neighborhood of North Platte or Grand Island, Nebraska, 400 miles from the starting point. It should be possible to receive satisfactory signals for some distance beyond these points; the horizon distance at maximum altitude will be about 350 miles. A major purpose of the tests is to determine *how much farther* signals may be received, and, insofar as possible, *with what intensity*. It seems worth while to listen for the signals at all points in the U. S. west of Chicago. The recording of the received intensity, or the mere fact of reception, at a number of places, and co-relation with the height of balloon, should present data of considerable interest. The Bureau expects to have equipment for measuring the intensity of the received signals at two places, Rapid City, S. D., and Grand Island, Neb. The widest possible participation of all amateurs with u.h.f. receiving equipment is desired. It is requested that amateurs and others avoid transmissions on nearby frequencies at the time of the flight. Reports should be sent to L. J. Briggs, Director, Bureau of Standards, Washington, D. C.  
— F. E. H.

## Hudson Division Convention

Place: New York City  
Date: June 1st.  
Hotel: Hotel New Yorker.

**DON'T FORGET!**



# A Complete 20-Watt 'Phone Operating on 110-Volt D.C. Mains

Illustrating the Wide Adaptability of the New Gas Triodes in Audio- and Radio-Frequency Circuits

By P. L. Spencer,\* W1CBE; and R. M. Purinton,\*\* W2ICU

*The experimental transmitter described in this article, employing the new RK-100 mercury-vapor type triode tubes in a variety of practical applications, illustrates the adaptability of the new tube to typical circuit arrangements and suggests the opening up of new fields for amateur experimentation. The transmitter is not intended especially as a model for complete reproduction but employs the simplest type of construction for the frank purpose of showing the extent to which usual practice can be used in handling the new tube. It will be of the highest immediate interest to the many amateurs handicapped by having only 110-volt d.c. supply available for transmitter operation.—EDITOR.*

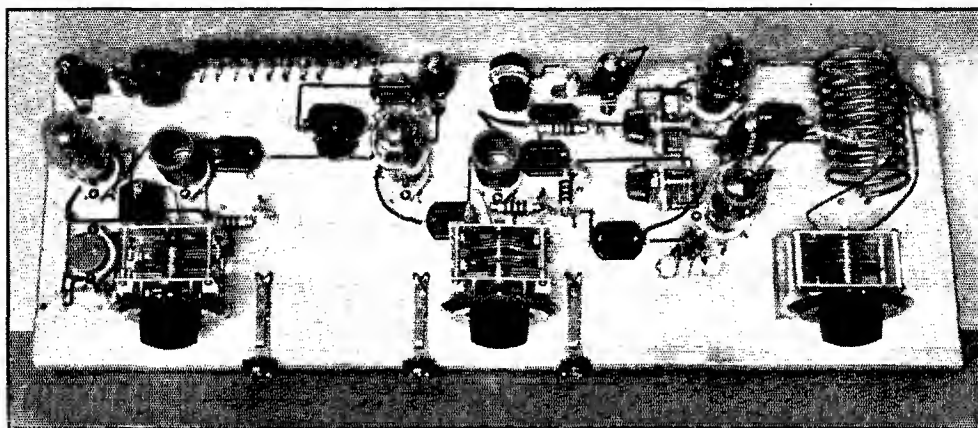
THE amateur building his first transmitter to-day has a choice of equipment and tubes which, placed end to end, would permit him to tap messages from coast to coast with a hammer—never minding the r.f. So we may think, at least those of us who live in areas supplied with a.c. But the picture hasn't been so bright for the man whose QRA is in a d.c. district of one of the large cities or in a locality equipped with a small 110-volt d.c. light plant.

Elsewhere in this issue of *QST* is described a new tube, just released from the laboratory, which is designed to help the amateur with a 110-volt d.c. power source. The RK-100 gas triode (or

The writers, with the new tubes available and prompted by that same curiosity which makes eight out of ten amateurs rebuild on a regular semimonthly basis, decided to give them a test on 14-megacycle 'phone in a transmitter that would do business on 110-volt d.c. plate supply—first with conventional a.c. supply equipment at West Newton, Mass., and then in New York City on the 110-volt d.c. mains prevailing in sections of that metropolis as it does in many other business districts.

## THE TUBE AND THE CIRCUIT

Examination of the RK-100 characteristics in-



THE BREAD-BOARD R.F. SECTION ASSEMBLY OF THE EXPERIMENTAL TRANSMITTER USING RK-100 MERCURY-VAPOR TUBES IN ALL THREE STAGES

The 7-mc. crystal oscillator is at the left, buffer-doubler in the center, and 14-mc. output stage at the right. The resistor lamps and fuse blocks, not shown, are connected in the 110-volt d.c. supply leads.

perhaps it should be called a tetrode, because it really has four elements) can be operated directly from the 110-volt d.c. socket.

indicated the same general parts line-up might be used as for a transmitter with conventional high-vacuum triodes. Of course crystal control was voted essential. The next step called for a doubler-buffer stage and then a final with two RK-100

\* 85 Adena Road, West Newton, Mass.  
\*\* 161 Moorland Drive, Scarsdale, N. Y.

tubes in push-pull. It was estimated that the power input to the final would run around 30 watts. For plate modulation that meant 12 watts or so of audio power with just one way to get it at 110 volts d.c.—more RK-100's in the audio system. Most ham transmitters—like Topsy—just grow up. This one is no exception except for the fact that the audio inter-coupling transformer is connected “backwards.” While that

effective cathode, combined with the small spacing of the elements, provides an exceptionally low plate impedance. In the load circuits of this transmitter, therefore, the only unusual factor to be taken into account is the low plate impedance characteristic. It will be noted from the circuit diagram that in the r.f. section the plate connection to the crystal oscillator is tapped down on the plate coil, and that in the final stage the plates

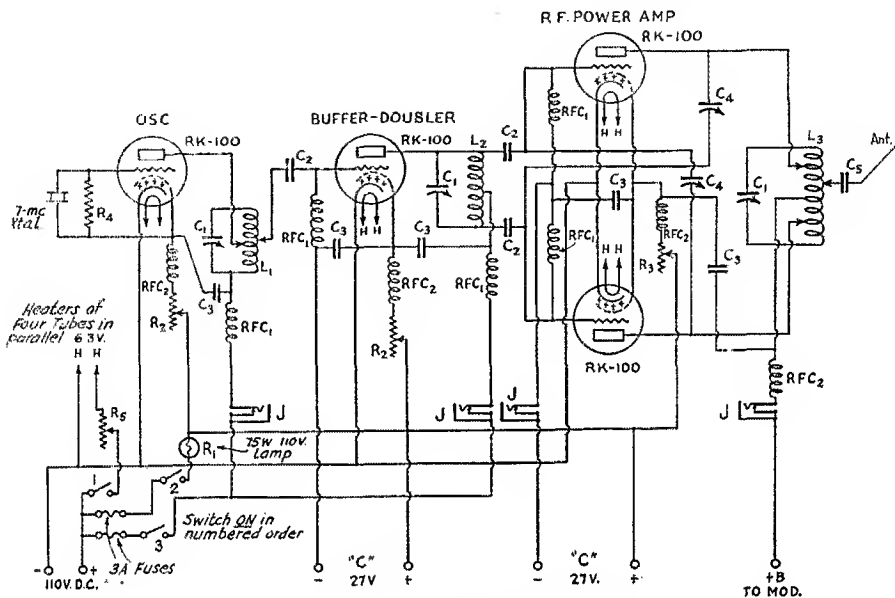


FIG. 1—CIRCUIT OF THE R. F. SECTION

C<sub>1</sub>—70- $\mu$ fd. max.  
C<sub>2</sub>—100- $\mu$ fd. mica.  
C<sub>3</sub>—0.002- $\mu$ fd. mica.  
C<sub>4</sub>—18- $\mu$ fd. neutralizing.  
C<sub>5</sub>—0.01- $\mu$ fd. mica.  
R<sub>1</sub>—75-watt 110-v. lamp.  
R<sub>2</sub>—250-ohm rheostat, 200-ma. max. (10 watt).  
R<sub>3</sub>—100-ohm rheostat, 400-ma. max. (15 watt).  
R<sub>4</sub>—3000-ohm 2-watt.  
R<sub>5</sub>—47.4-ohms (approx.) 2.5 amp. (See text).

RFC<sub>1</sub>—Midget r.f. choke (Hammarlund or National).  
RFC<sub>2</sub>—R.f. choke with current capacity of 300 ma. (May be omitted in cathanodes. See text).  
L<sub>1</sub>—18½ turns No. 20 enam., 1½-inch diameter, winding length 1½ inches.  
L<sub>2</sub>—9½ turns No. 20 enam., 1½-inch diameter, winding length 1½ inches.  
L<sub>3</sub>—9 turns ¼-inch copper tubing 2-inch diameter by 4 inches long.

happens accidentally now and then, this time it is deliberate and an advantage, as will be pointed out later.

The RK-100 tube contains mercury vapor. It might be expected, therefore, that there would be some radically peculiar circuit connections, or at least that the circuit would deviate considerably from conventional circuits used in amateur equipment. This is not the case for the simple reason that the plate, grid and cathode or effective cathode are so close together that ionization of the mercury vapor cannot occur between them. The grid or input circuit to the RK-100 operates at a fairly high impedance just as it would with a high vacuum tube. Similarly, the plate circuit impedance is in no way affected by the presence of ionized mercury vapor at the center of the tube. However, the unusually large surface of the

are connected in from the end of the plate tank.

Fig. 1 gives the circuit of the radio frequency section of the transmitter, the connections and resistance values being proper for operation at 110 volts d.c. In the first layout, which used a.c. and rectified a.c. for operation, there was but one difference. The heater circuits were operated from a 6.3-volt transformer with the center tap connected to B-minus. Tests were made with the cathanode ionizing voltage taken both from the d.c. plate supply and from a separate 24-volt rectifier similar to the type used for theater storage battery eliminators. With a Variac connected in the primary of the plate supply unit, it was possible to vary the plate voltage to the whole transmitter over a range of from 110 volts to 500 volts d.c., although in the tests on the air with the transmitter the plate voltage was kept at 110

volts and adjustments were made with the effective cathode resistors or rheostats for maximum power output.

Just to make it harder, the crystal stage of the transmitter operates in the 40-meter band. Reference to the characteristic curves for the tube indicate that it is very easily excited. With an amplification factor of approximately 50 and plate resistance which may vary from approximately 400 ohms down to 80 ohms, depending on the bias used, the mutual conductance is extremely high. As would be expected from these characteristics, it was the writers' experience in constructing the transmitter that the RK-100 is more easily driven by the crystal than any other oscillator tube employed in the regular transmitters at either station. To

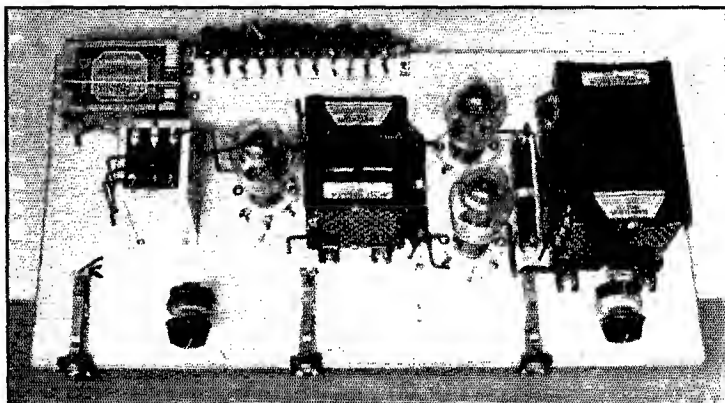
satisfy the low plate impedance of the tube, it was found desirable to connect the plate of the crystal oscillator tube to the plate tank coil at a point about half-way between the high- and low-voltage ends of the coil. The connection for excitation to the following stage was placed at the mid-point also. Although this point was chosen arbitrarily, it was found to give very satisfactory results and no change was made. The oscillator plate current varies exactly as it does in a high-vacuum tube when the plate tank circuit is tuned.

The doubler-buffer stage is conventional in every respect. The grid-bias circuit is completed to the effective cathode through a small radio frequency choke and by-pass condenser. Battery bias of 27 volts negative is applied to this stage between the lower end of the radio-frequency choke and the supply terminal carrying positive voltage for the ionization of the space between the effective cathode and the cathode of the tube. The plate tuning coil is tapped at the center for the plate supply voltage and at the ends for excitation connection to the final stage.

The final push-pull stage has its grid-bias circuits completed through small radio-frequency chokes and is supplied with negative bias of 27 volts from C batteries. This stage operates as a "straight" amplifier on 14 mc. and therefore requires neutralization. The neutralizing condensers are midgets, double-spaced seven-plate units with a maximum capacity of approximately 35  $\mu\text{fd}$ . In tuning the transmitter it was found the tubes were properly neutralized with the condensers set at half capacity. In another layout

this adjustment might be found to differ slightly because of length of leads and capacities between leads.

The plate tank circuit is similar to the circuit which would be used with any high vacuum tubes



**THE SPEECH AMPLIFIER AND MODULATOR UNIT OF THE TRANSMITTER, THE INPUT STAGE BEING AT THE LEFT AND OUTPUT AT THE RIGHT**  
*Operated directly from 110-volt d.c. mains, it delivers 12 watts or more of audio power with double-button carbon mike input. The battery at the left is for the microphone, bias supplies and dropping resistors being separately mounted.*

except for the fact that the plates are tapped in from the ends of the tank. In this particular case it was found that the power output was maximum when the plates were connected in on the second turn from each end. The antenna used in the tests on the air employed single-wire matched impedance feed. The antenna tap was connected to the final tank at a point which gave proper loading with no evidence of standing waves on the feeder.

In Fig. 1, resistance  $R_4$  is a 75-watt 110-volt lamp. This drops the line voltage from 110 volts to approximately 15 volts d.c. for ionization of the space between the cathanode and the heated cathode. Resistor  $R_5$  is a variable unit used to drop the 110-volt d.c. supply to 6.3 volts for the tube heaters. Reference will be made later to the value of this resistor.

It will be noted in Fig. 1 that the cathanode elements in the tubes are fed through radio frequency chokes. These radio frequency chokes should be capable of passing at least 300 ma. The necessity for them is questionable and if the transmitter were to be built again, they would be omitted experimentally in the new layout. Their use in this transmitter was based on the desirability of eliminating any possibility of radio frequency current in the effective cathode circuit.

#### AUDIO CIRCUITS

Fig. 2 shows connections used in the speech amplifier and modulator of the transmitter. Three transformers are employed, two of them connected in the conventional manner. The first

transformer,  $T_1$ , is a standard microphone input transformer for a double-button microphone. The speech amplifier tube, also an RK-100, operates with a negative grid bias of 4.5 volts from a C bat-

teries becomes evident at once when the match between the secondary of the modulation transformer and the actual load is considered. Figuring the input to the final r.f. stage at 100 volts plate

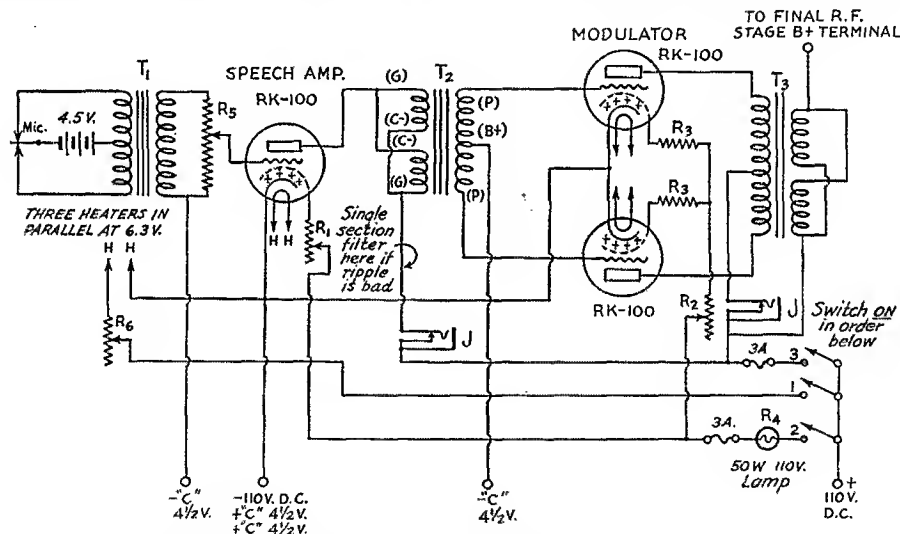


FIG. 2—THE SPEECH AMPLIFIER AND MODULATOR CIRCUIT

- $T_1$ —Input transformer. Double button microphone to single grid.  
 $T_2$ —Interstage transformer. Class-B input, split secondary. Usual "secondary" windings connected in parallel for plate circuit. "Primary" used for following push-pull grid circuit. (See text).  
 $T_3$ —Modulation transformer. Class-B output suitable for

- 46's (See text).  
 $R_1$ —250-ohm rheostat, 200-ma. max. (10 watt).  
 $R_2$ —100-ohm rheostat, 400-ma. max. (15 watt).  
 $R_3$ —50-ohm 200-ma. max. (5 watt).  
 $R_4$ —50-watt 110-v. lamp.  
 $R_5$ —100,000-ohm potentiometer (Volume control).  
 $R_6$ —66.6 ohms, 2-amp. capacity (See text).

tery. The intermediate coupling transformer,  $T_2$ , is a Class-B input transformer designed originally for coupling two Type 2A3's to the grids of two 203-A tubes. It is unnecessary to use a transformer as large as this one, but this particular type happened to be available and, since it had the proper connections, it was used. It will be noted that the normal secondary winding has been used for the plate circuit of the speech amplifier tube and that the primary is connected to the following grids in the modulator stage. The secondary on the transformer was split, permitting connection of the two secondary sections in parallel, with resulting reduction in impedance on the plate side of the transformer. On the grid side the "B-plus" connection is used for "C-minus," and the two "plate" ends are connected to the grids of the modulator tubes.

The modulator stage is also operated with the grids biased at negative  $4\frac{1}{2}$  volts by a "C" battery, and with the plates connected to the plate terminals on a standard Type 46 Class-B output transformer,  $T_3$ . This transformer, which happened to be made up with two separate secondary windings, was connected so that the two secondaries were in parallel, providing a load resistance of approximately 4000 ohms for matching purposes. The experimental nature of this transmitter

and 250 ma. maximum, the load resistance is 440 ohms. The result of this mismatch is a presumable loss in power and it might be expected that the quality would be affected also. However, in the test of the transmitter on the air, the stations worked reported the quality as exactly like that of the main transmitter.

In Fig. 2 the resistor designated  $R_4$  is a 50-watt 110-volt lamp, used to drop the 110-volt d.c. supply to approximately 15 volts for the cathode circuit. Resistor  $R_5$  is the series unit used to drop the voltage from 110 volts d.c. to 6.3 volts for the heaters of the three tubes in the speech amplifier and modulator section. The value of this resistor for different tube combinations is covered in the section to follow.

#### HEATER SUPPLY

Practically all 110-volt d.c. lines operate at fluctuating voltages running between 120 volts and 105 volts. Because of this variation, it is essential that the tubes operated from the line be run at approximately 6.3 volts for the average line-voltage value. It is almost essential that the filament voltage be measured with a reliable meter kept permanently in the circuit. Fortunately, d.c. meters of this type are cheap and are

(Continued on page 68)

# Air-Mass Conditions and the Bending of Ultra-High Frequency Waves

New Light on How 5-Meter Signals Are Transmitted Over Long Indirect Paths

By Ross A. Hull\*

Since the establishment of consistent communication between Boston and West Hartford amateur stations last August, first reported in October 1934 QST, the transmissions of 56-mc. DX stations have been regularly observed and the strength of special signals from W1XW at Blue Hill have been photographically recorded at West Hartford by Ross Hull. From the beginning of this program an effort was made to account for the apparent ability of supposedly quasi-optical waves to travel such unexpected distances with a consistency denying freak conditions; and to explain the fading and other effects that were previously strange to us on the ultra-high frequencies. The finding of some correlation between humidity conditions and signal behavior early in the program, as mentioned in December 1934 QST, led to more thorough investigation of the simultaneous weather and general meteorological conditions. With the splendid cooperation of scientific groups at Harvard University and Massachusetts Institute of Technology, as well as other workers, Associate Editor Hull has been enabled to establish for the first time the direct relationship between air-mass phenomena in the lower atmosphere and the transmission of u.h.f. radio waves beyond the horizon. The substance of this article, is from a paper delivered by Hull at the recent Washington meeting of the U.R.S.I. and I.R.E. It is not unreasonable to expect that this result of amateur radio activity will open up new avenues, not only in radio communication, but also in meteorological studies related to weather forecasting.—EDITOR

UNTIL recently the routine experimental work over short distances on the ultra-high frequencies did not reveal consistent performance calling for a modification of our first ideas concerning the propagation of very short waves. According to the accepted theories, the lower atmosphere should give us some bending by refraction; but this bending, together with the effects of diffraction and reflection, should allow ultra-high frequency signals to travel over paths extending only *slightly* beyond the line of sight. The extent of the bending, as computed by many workers, would be such that the ray should follow a trajectory having a radius of curvature 4 to 5 times that of the earth's radius.

Our first indication that something was amiss with this concept resulted from the exchange of strong signals<sup>1</sup> on 60 mc. between West Hartford and Boston over paths of approximately 100-mile length, requiring a much smaller equivalent radius of curvature (approximately 60 per cent. of the earth's radius). This extraordinary bending would not have been noteworthy had it occurred only on isolated "freak" occasions. When it served to give us daily communication with Boston over a period of months, and even enabled frequent contacts with more distant northerly stations and with stations in the New York area, it was apparent that some of the assumptions in the current theory were incomplete. Obviously, the whole problem was worth restudying.

The contours of Fig. 1 give us some idea of three of the paths and the amount of bending involved. Other longer paths, to be mentioned, are similar in that the same ridges of hills must be crossed.

\* Associate Editor, QST.

<sup>1</sup> First reported in QST for October, 1934.

## SUMMER TESTS

The most surprising effects observed during the first few days of communication between West Hartford and the Boston area were the extremely high signal level obtained on occasions, the pronounced diurnal change, resulting in low signal level around noon, and the marked fading, which would sometimes vary signals from R1 to R3 in, say, five minutes. Unquestionably we were experiencing something quite different from the extremely rapid and very slight variations reported by other workers. As the test period progressed, however, it became more and more conclusive that we were dealing with phenomena *by no means abnormal*. The recurrence of good transmitting conditions almost every evening caused us to attempt a much closer examination of the whole question. On August 20, Dr. C. F. Brooks of the Blue Hill Observatory provided the facilities of W1XW for special schedules each morning and night. Then, on August 25, W1HRX, at Middleton, Mass., erected a directive array and maintained morning and evening schedules. The observation of signals from these two stations, in particular, showed that communication could be maintained quite reliably. It is interesting to note that W1HRX, located some 13 miles farther than Blue Hill from West Hartford, and at an elevation approximately one-third that of Blue Hill, maintained a higher and more consistent signal level than the nearer station. We believe that the superior performance of W1HRX was due almost entirely to the gain made possible by his directive array.

During this test period with W1XW and W1HRX, and, for that matter, during the entire nine months of observation, a search was made each morning and evening for signals from any of

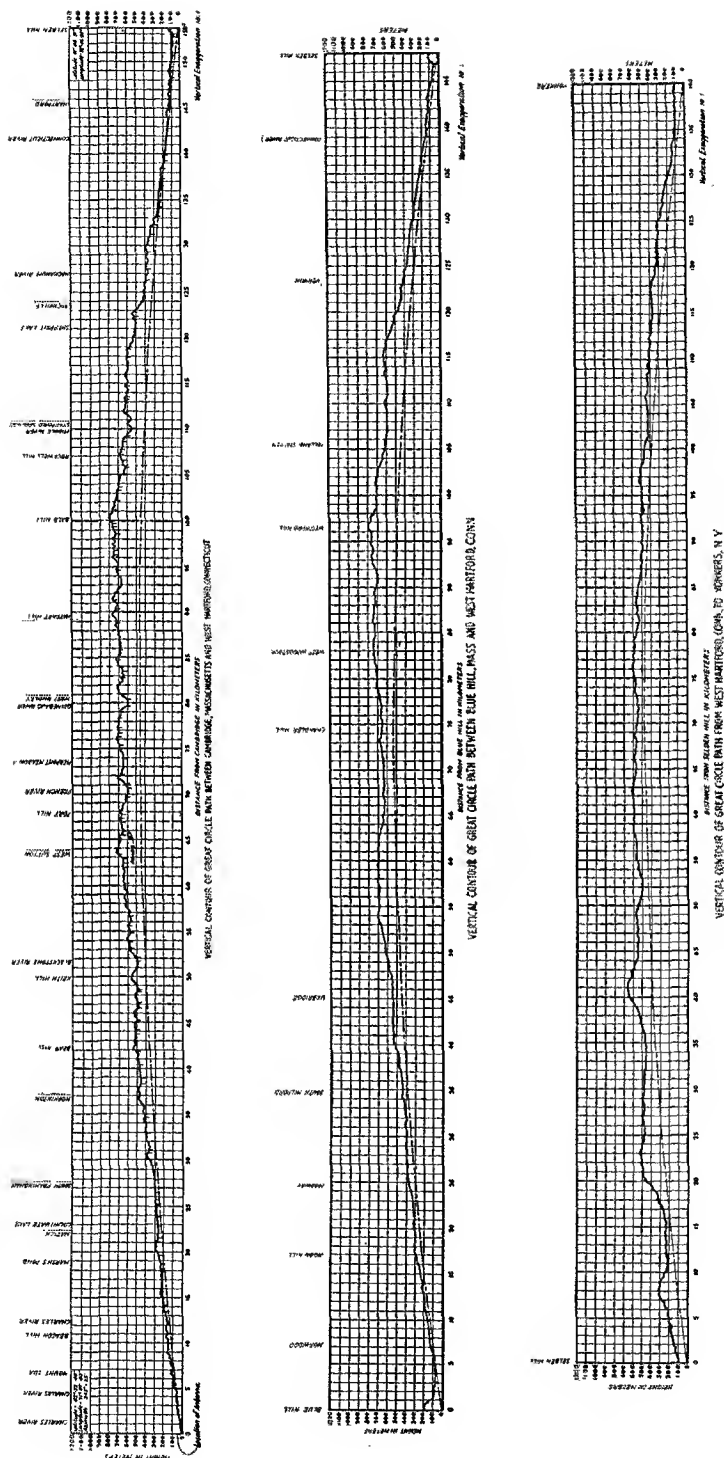


FIG. 1—VERTICAL CONTOURS OF THREE OF THE PATHS DISCUSSED IN THE TEXT

In plotting these contours, the scale used for elevations has been increased ten times and the scale used for the radius of the earth decreased ten times. In this way, irregularities of the contour are made more apparent. With this distortion, however, a straight line on the actual path remains a straight line on the contour drawing.

Path 1 (upper) is that between Cambridge, Mass., and West Hartford (98 miles), a path over which frequent schedules have been maintained with W1RQV located at Harvard University. The intervening ridge of hills is 1200 feet high. This, together with the low elevation of the Cambridge antenna, calls for an equivalent ray path having a radius of curvature approximately 62 per cent. of the earth's radius. This path resembles very closely those between Hartford and the majority of Boston amateur stations. It is also similar to the path between West Hartford and W1HRX at Middleton, Mass., except that in the latter case, the Boston area station is approximately 13 miles farther north and about 50 feet higher. This path represents an approximate curvature of 58 per cent. of the earth's radius.

Path 2 is that between West Hartford and the Blue Hill Observatory of Harvard University located near Milton, Mass. (93 miles). The most serious obstruction along this contour is a ridge of hills approximately 800 feet above sea level. The curved path joining the two stations and clearing the intervening terrain has a radius of curvature approximately 68 per cent. of the earth's radius. Notwithstanding this pronounced curvature, signals have been exchanged between the two points on 234 out of the 239 days on which transmissions were made.

Path 3 is that between West Hartford and Yonkers, New York (88 miles). Because the obstructing hills are near the West Hartford end, the ray clearing the major elevations requires an equivalent radius of curvature of less than 50 per cent. of the earth's radius. This very pronounced curvature undoubtedly explains the inferior performance obtained relative to the performance with Boston stations. It, nevertheless, represents an example of the extent to which ultra-high frequency waves can be bent under particular circumstances.



the low-lying amateur stations in the Boston area. As we will presently show in chart form, signals from these stations were heard at frequent intervals. We soon found that conditions permitting reception of the low-altitude stations did not necessarily coincide with the highest signal peaks from the more elevated station, W1XW. This point is considered to be of some importance. A further observation at this time was that the very highest peaks of signal level were, almost invariably, a prelude to precipitation and a reversal of weather conditions. It was during these pre-storm periods that the best communication was had with such stations as W1XZ at Seabrook, New Hampshire, W1XR on Mt. Washington and W2CUZ, W2AG and W2EKC and W2JN in Yonkers, New York, and Montclair, New Jersey. It was on one such occasion that the West Hartford signals were heard strongly by Mr. H. S. Shaw, W1FGA, operating portable equipment on Cadillac Mountain, 1000 feet above sea level and 282 miles from West Hartford. It also became notable at this time that the worst signal fluctuations occurred on hot days when the atmosphere was most turbulent and at certain periods during the passage of storm fronts.

As winter approached, the intervals of very high signals became more widely separated and more clearly defined. Further, the relation between the stormy periods and the rise of signals became much more noticeable.

#### WINTER CONDITIONS

During November and December, occasional recordings<sup>2</sup> were made of transmissions from W1XAV at Squantum, Mass., and of the tone signals from W1XW. These recordings showed a general trend towards high signals in the early hours of the morning and revealed many short periods of high level which would not have been noticed in the normal routine of morning and evening schedules. In January it was decided to explore the diurnal changes in transmission between Hartford and Boston and to attempt to define the particular weather conditions involved in the enormous changes in signal strength which occurred. Dr. Brooks of the Blue Hill Observatory responded immediately to the request for hourly tone signals day and night; and, because of his cooperation, it has been possible to make substantially unbroken recordings from early January to the present time.

When two months of recordings had been completed, the data were studied closely in conjunction with meteorological data supplied by the Blue Hill Observatory, the Meteorological Department of Massachusetts Institute of Technology and the U. S. Weather Bureau. As had already been observed, a relationship between storm conditions and strong signals was shown.

<sup>2</sup> A description of the photographic recorder appeared in the March, 1935, QST.

As had been anticipated, this general relationship resolved itself more specifically into an intimate connection between periods of pronounced temperature inversion<sup>3</sup> in the lower atmosphere and periods of high signals. That is to say, a layer of warm air overrunning colder air, invariably accompanied good transmission periods. Since the conventional weather information contains no values for these temperature inversions, a study was undertaken of the meteorographic data made available by the Massachusetts Institute of Technology and the U. S. Weather Bureau as the outcome of their "Free Air" airplane flights. Extensive additional material was made available by Dr. Brooks covering the temperature differences (temperature lapse rates) between low-altitude meteorological stations in the vicinity of Boston and the summits of Blue Hill and Mount Washington. The study provided undeniable evidence of a close relationship between small lapse rates and high signals. The lapse rates shown by the airplane records provided particularly striking evidence of this correlation, notwithstanding the appreciable distance which sometimes separated the region in which the flight took place and the path over which the signal measurements were made.

While an attempt was made to isolate one particular layer in which the order of temperature inversion followed the signal level, the procedure proved futile. On one occasion, the steepest region of inversion would be, perhaps, between altitudes of 500 and 1000 meters. On other occasions, with a similar order of signal level prevailing, the steepest inversion would be found between 1000 and 2000 meters. In still other examples, the significant inversion would extend from the surface to 1000 meters. Generally speaking, *it appears that an extensive sub-normal lapse rate anywhere in the region between 300 and 2500 meters is accompanied by a high 80-mc. signal level over the path between West Hartford and Blue Hill.*

Having established a relationship between lapse rate in the lower atmosphere and signal level for the period during which hourly signal measurements were made, the next step was to view the entire period of observation in terms of the prevailing air masses. This study was made possible through the cooperation of Dr. H. C. Willett and Dr. Karl O. Lange of the Meteorological Department of the Massachusetts Institute of Technology.

The work was complicated by the fact that, during the warmer months, the identification of

<sup>3</sup> In a "normal" atmosphere, the temperature of the air decreases steadily as the elevation above the earth is increased. This normal temperature gradient gives a drop in temperature (or lapse rate) of approximately 1 degree Fahrenheit for each 300 feet of elevation. When the temperature fails to drop as rapidly as this, a temperature inversion is said to exist. In some of the instances discussed, the temperature of the air actually increased 10 degrees centigrade in the first 1500 meters above ground.

discrete air masses is not always possible. Nevertheless, the periods of highest signal level were found to be associated with an atmospheric structure involving a layer of moist, warm tropical air overrunning a shallow layer of dry, cold polar air. In the warmer period, this associa-

normal. It became clear, also, that what are known as subsidence and nocturnal inversions forming in slowly moving air masses played a part in maintaining the higher and more consistent signals characteristic of the earlier summer period of this program.

With the approach of the colder weather and the accompanying simplification (for the weather man) of the process of segregating air masses, the general correlation became quite striking. From late October through the entire winter period, low signal levels invariably prevailed during the presence of fresh polar air. As this air mass became modified by subsidence and isolational heating, small increases in signal level could be seen. The well-defined high periods, however, occurred only upon the intermingling of air masses of different types, the signal increase being particularly marked on all occasions when a prevailing cold, dry polar air mass was overrun by warm, moist air from the tropical regions. In such cases the signal level would increase rapidly as the tropical air reached down to the lower elevations. As the level of marked inversion approached an estimated height of 1000 meters, the recorded signals appeared to reach their peak. As the inversion level proceeded still lower, signals from low-lying amateur stations were found to increase rapidly and often to surpass in strength the signals from the higher station W1XW. This atmospheric condition, of course, was almost invariably followed by precipitation. The signals dropped sharply

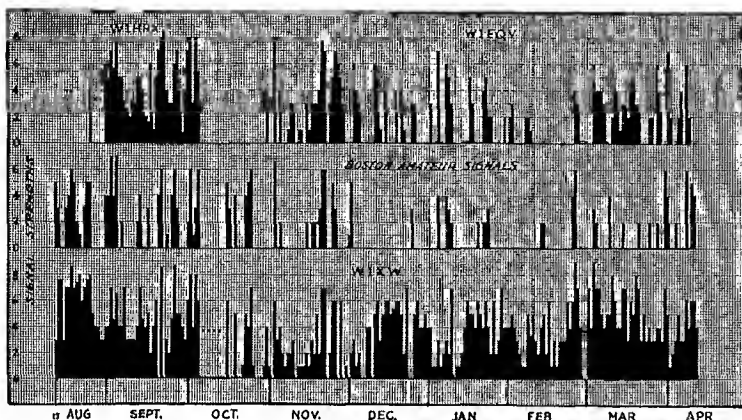


FIG. 2—PROVIDING A GENERAL PICTURE OF COMMUNICATION EFFECTIVENESS ON 60 MC. BETWEEN WEST HARTFORD AND THE BOSTON AREA

From the section at the upper left, we see that contact with W1HRX (111 miles) did not fail during the period of schedules. Numerous gaps are seen in the record of signals from W1FQV but most of them correspond to days on which no schedules were attempted. Signals from the Boston area amateur stations are seen to thin out appreciably during the colder months. The reliability of the more elevated station W1XW is obvious. Only five of the gaps represent days on which communication failed.

tion was by no means infallible but it became apparent that signals dropped to their lowest levels during the existence of a homogeneous air mass having a temperature lapse rate approaching the

increase being particularly marked on all occasions when a prevailing cold, dry polar air mass was overrun by warm, moist air from the tropical regions. In such cases the signal level would increase rapidly as the tropical air reached down to the lower elevations. As the level of marked inversion approached an estimated height of 1000 meters, the recorded signals appeared to reach their peak. As the inversion level proceeded still lower, signals from low-lying amateur stations were found to increase rapidly and often to surpass in strength the signals from the higher station W1XW. This atmospheric condition, of course, was almost invariably followed by precipitation. The signals dropped sharply

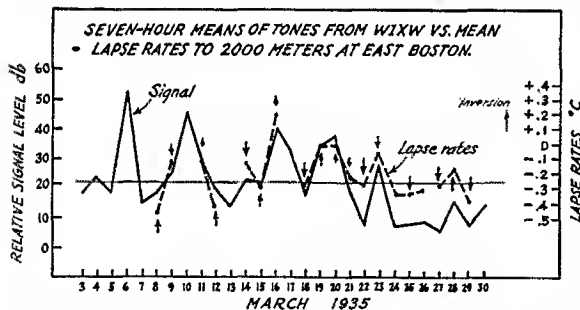
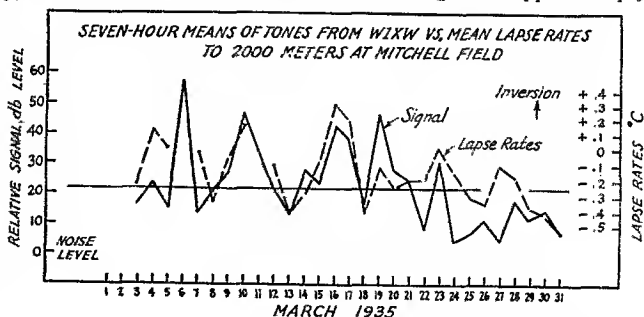


FIG. 3—ONE OF MANY EXAMPLES SHOWING THE CORRELATION BETWEEN SIGNAL STRENGTH AND TEMPERATURE LAPSE RATE

The gaps in the dotted curve result from a lack of meteorological data. Weather conditions often make it impossible for the meteorological airplane flights to be made.

FIG. 4—SIGNAL LEVELS FOR THE SAME PERIOD AS FIG. 3 PLOTTED AGAINST LAPSE-RATES MEASURED AT MITCHELL FIELD (NEAR NEW YORK)



coincident with the complete inflow of the relatively homogeneous tropical air mass or, on the other hand, with its displacement by the outbreak of fresh continental polar air.

THE RECORDS

It would be well at this stage to examine some typical examples of these phenomena in graphical form. Fig. 2 shows the trends exhibited by various signals under observation during the period of the program. The order of reliability of the signals from W1XW is seen. The actual reliability is even better than that indicated, since some of the smaller gaps represent days on which no schedules were attempted. The block at the upper left of this diagram shows the performance obtained during the period of morning and evening schedules with W1HRX. This period of communication was perhaps the most reliable sequence of all. The remainder of the upper curve illustrates the strength of signals from W1FQV at Harvard University and the occasions on which they were heard. This section is considerably misleading since unbroken daily schedules were not maintained. The center chart shows the periods at which low-lying amateur stations in the Boston area were heard at West Hartford. The thinning out of these signals during the winter months is apparent. The regularity with which low-lying stations were heard during the warmer months is considered to be the result of the prevalence at those times of very strong and low-lying temperature inversions caused chiefly by radiational phenomena and the effects of sea breezes. It is noted that these low-lying stations were heard, during the winter, only on occasions when the significant inversion was known to be at a very low elevation. The progress of the present season has, on the other hand, already provided us with good signals from the amateur stations on occasions when the major "air mass" inversion was at a high level but when it was accompanied by a secondary very low inversion of limited geographic dimensions. The higher signal levels ob-

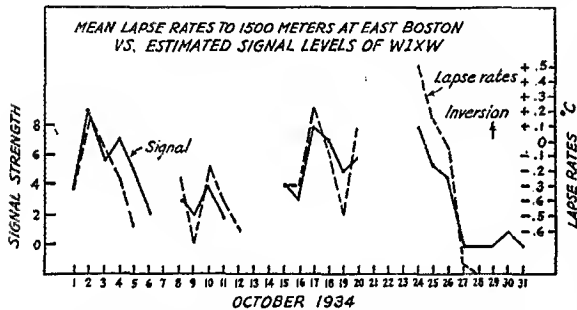


FIG. 5—ONE SAMPLE OF SIMILAR CORRELATION BETWEEN SIGNAL LEVEL AND LAPSE RATE DURING THE EARLIER PERIOD OF THE WORK

Both signal and meteorological data for the warmer months are, unfortunately, fragmentary.

tained during the summer are considered to be related to the higher specific humidity prevailing during that season.<sup>4</sup>

Fig. 3 and Fig. 4 following it are examples selected from many graphical studies made in the attempt to correlate temperature lapse rates and signal levels. In the first example, the lapse rates, as measured in the M.I.T. meteorological airplane

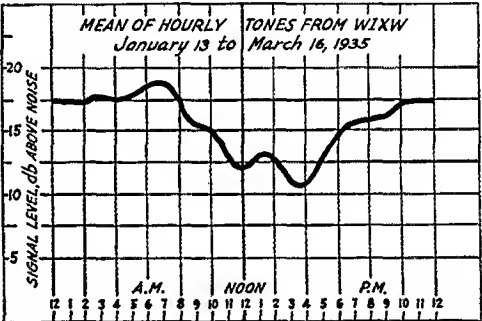


FIG. 6—SHOWING THE MANNER IN WHICH SIGNALS VARY DURING THE COURSE OF THE DAY

In this curve, the average level of the recorded signal is plotted for each hour.

at Boston, are plotted against the mean signal values obtained during a period including three hours before and after the time of the flight. The arrows adjoining the various values of lapse rates represent the direction in which a correction would be applied in taking into account the influence of the prevailing humidity. It is of interest to note that in each case a consideration of water vapor content would improve the apparent correlation. Numerical treatment of actual atmospheric density gradients and refractive indexes has not been attempted at this stage chiefly because of the known irregularity of humidity measurements made under the conditions met with in "free air" ascensions.

Fig. 4 shows the result of an attempt to establish, for the same period, a correlation with the lapse rates measured at Mitchell Field (100 miles southward from West Hartford). This study, in conjunction with the example just discussed, provides an illustration of the wide geographic extent and similarity of many inversions during the winter period. Similar attempts to obtain the three-cornered relationship between signal levels and the lapse rates at Boston and Mitchell Field, for the warmer periods, were rarely as successful. The Boston lapse rate, however, continued to exhibit a very close relationship with the signal level, as is indicated in the few examples given in

<sup>4</sup> The mean water vapor content of the air at ground level at Boston is approximately 5.17 times greater in July than in February.

Fig. 5. It is to be regretted that "free air" data, and, particularly, precise signal data for the early hours of the morning are unavailable for August and September.

Fig. 6 represents the mean signal level for the various hours of the day during January, February and March. This diurnal curve, it will be seen, happens to show a close resemblance to the known diurnal variations of lapse rate, surface temperature and surface humidity. Mr. Green-

## CONCLUSIONS

This preliminary qualitative survey, over these particular indirect paths, shows that stratification of the lower atmosphere is very frequently responsible for an order of bending of ultra-high frequency waves considerably greater than that accounted for in analytical studies of atmospheric refraction. The assumption, in such studies, that the atmosphere is normally homogeneous, with a uniform water vapor gradient and a steady tem-

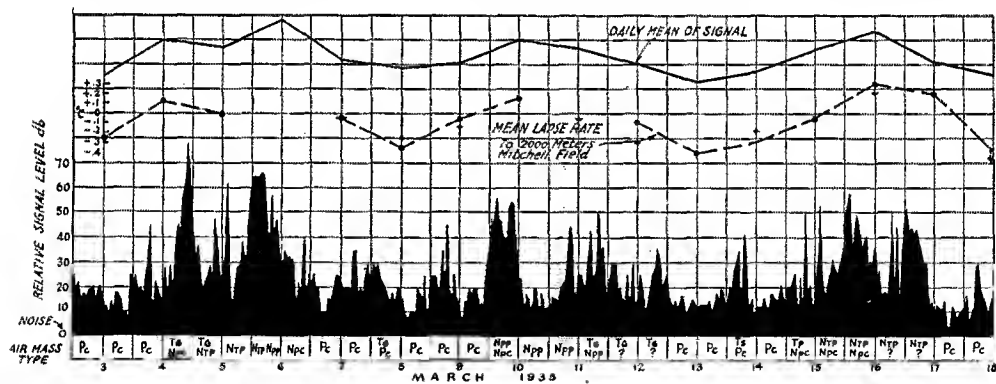


FIG. 7—THE INTIMATE RELATIONSHIP BETWEEN CONDITIONS IN THE LOWER ATMOSPHERE AND SIGNAL STRENGTH IS SHOWN IN THIS TRANSCRIPTION OF SIGNAL RECORDINGS

The abbreviations on the lower line are used in meteorological work to designate particular types of air masses. The "Pc" mass which accompanies low signals is of dry, cold air arriving from the polar regions across Canada.

leaf W. Pickard, in an unpublished paper, indicates that this diurnal characteristic, as measured by him on more nearly direct paths, shows considerable change from month to month, particularly in respect to the "humps" seen around noon.

Fig. 7 is a transcription of a section of the signal recordings during March. The various points of this curve represent the values of the hourly tone from W1XW. While these variations represent relatively tremendous changes in signal input, the logarithmic sensitivity characteristic of the super-regenerative receiver reduces the apparent swing and causes the signal to be audible even at the lowest point indicated on this recording. The extent of change in the receiver output could be stated as being approximately R1 to R8. The solid curve above represents the daily mean of the recorded tone levels. Below it is a dashed line connecting points representing the mean lapse rate between the surface and 2000 meters, measured at Mitchell Field. Occasional crosses in the vicinity of this dashed line represent the only available lapse rates, to the same elevation, taken at East Boston. Indicated below the signal recordings are the types of air masses prevailing over the path. In this example, the effect of the Polar Canadian air mass in holding signals at a low level can be seen. The influence of stratification resulting from the intermingling of two air masses of different types is also shown.

perature lapse rate has possibly given a misleading result.

It is undoubtedly true that diffraction and reflection play a part in providing a sub-threshold but practically undetectable signal in the instances just discussed. It is extremely probable, though, that the dominant phenomena involved is that of refraction. Evidence tending to substantiate this probability is provided by the several instances during which a prevailing dry, cold and homogeneous polar air mass resulted in a complete absence of signals for periods of a day or more.

We cannot resist commenting on the several fallacious popular beliefs concerning the behavior of ultra-high frequency waves, particularly as to their freedom from fading and the limitation of their range to paths only slightly in excess of the optical range. On the contrary, it is evident that at distances far beyond the optical range, signals, even from low-powered transmitters, are prone to reach very high signal levels under certain atmospheric conditions and that fading of these "air wave" signals is not unlike that experienced with "sky wave" transmissions on the lower frequencies.

So striking is the relationship between signal level and the prevailing lapse rate that it is not illogical to visualize the future application of

(Continued on page 74)

# Why Does Automatic Bias Bias?

By W. B. Girkin\*

**S**O MANY amateurs have puzzled over automatic biasing methods—and still do not understand why their 10's burn out when the crystal oscillator stops—that a discussion of the topic seems timely.

Bias for tubes in a receiver is secured by means of a resistor from the cathode—or from the filament center-tap if the cathode is directly heated—to ground. You may ask, "How does this give bias to a tube?" The bias is secured not by placing a negative voltage on the grid, but by placing a positive voltage on the cathode, i.e., the cathode is raised above ground potential. Biasing is nothing more than making the grid negative with respect to the cathode. Hence, with the grid at ground potential and the cathode say 10 volts positive with respect to ground potential, we have a bias of 10 volts on the tube. The cathode is raised above ground potential because the plate current is flowing through the resistor from cathode or filament center-tap to ground, as shown in Fig. 1. This makes the end of the resistor next to the filament positive with respect to ground and the grid. This method of biasing is common in receivers, but less frequently used in transmitters because the bias voltage so obtained reduces the effective plate voltage by the amount of bias voltage developed.

Another plan for obtaining automatic bias for the transmitter is by the use of a resistor—or leak—in the grid circuit. This system, however, gives bias to the tube only when the grid is being

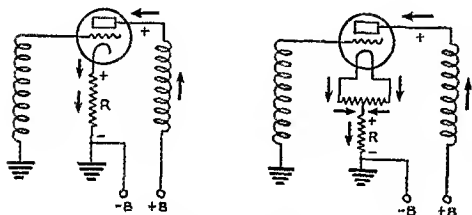


FIG. 1—AUTOMATIC BIAS BY THE CATHODE-RESISTOR METHOD

Both directly heated and indirectly-heated type tubes are indicated. The arrows indicate the direction of the plate current flow, using the conventional system (on the assumption that current flows from positive to negative).

driven sufficiently positive by the r.f. excitation voltage so that rectification takes place and d.c. grid current flows, as shown in Fig. 2. The flow of rectified grid current through the grid resistor causes a voltage drop, and because of this voltage drop, the grid actually becomes negative with

\*Radio Instructor, Port Arthur College, Port Arthur, Tex.

respect to ground potential while the filament remains at ground potential, hence a bias voltage results. This type of bias cannot be used successfully in receivers because the grid is never driven into the positive region. In transmitters, however, there is an enormous voltage swing on the grid,

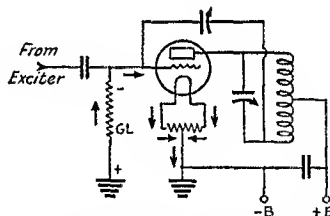


FIG. 2—AUTOMATIC BIAS WITH GRID LEAK  
Arrows indicate direction of rectified grid current flow.

and grid current flows. Should anything happen to the oscillator to cause it to stop exciting the grids of any tubes that may be so biased, the grid current flow ceases and the bias disappears. With tubes having low and medium values of amplification factor, the loss of bias will cause the plate current to rise excessively and the tube may be damaged as a result.

## Coming Examinations for Amateur Operator License

**F**OLLOWING is a complete schedule of all examinations for amateur operator license to be held by the F.C.C. during May, June and July. All examinations begin promptly at 9:00 a.m. local time. *Examinations are not held on national holidays.* Where dates or exact addresses are not shown, write the Inspector in Charge at the district headquarters as noted.

Washington, D. C., 7333 I.C.C. Bldg., every Thursday.

Boston, 7th floor, Customhouse, daily except Thursdays.

New York, 1024 Federal Bldg., 641 Washington St., every Tuesday, Thursday and Saturday.

Troy, N. Y., sometime in June. Details from New York office.

Philadelphia, 1200 New U. S. Customhouse, every Wednesday.

Baltimore, Ft. McHenry, every Saturday.

Norfolk, 402 New Post Office Bldg., every Friday.

Winston-Salem, N. C., May 3rd and 4th. Details from Norfolk office.

Atlanta, 411 New Post Office Bldg., every Tuesday and Friday.

Nashville, May 17th. Details from Atlanta.

Miami, 12 New Federal Bldg., daily by appointment.

Jacksonville, May 15th. Details from Miami, addressing P. O. Box 150.

New Orleans, 326 Customhouse, every Tuesday.

Galveston, 209 Prudential Bldg., daily by appointment.

Dallas, 464 Federal Bldg., every Tuesday and Friday.

Oklahoma City, May 11th. Details from Dallas.

San Antonio, June 8th. Details from Dallas.

Los Angeles, 1105 Rives-Strong Bldg., every Monday and Saturday.

San Francisco, 328 Customhouse, every Monday.

Portland, Ore., 207 New U. S. Courthouse, every Friday.

Seattle, 808 Federal Office Building, every Friday.

Butte, Montana, sometime in May. Details from Seattle office.

Spokane, Wash., sometime in May. Details from Seattle office.

Denver, 538 Customhouse, first and third Saturdays of each month.

St. Paul, 927 New Main P. O. Bldg., first Saturday of each month.

Kansas City, Mo., 410 Federal Bldg., first and third Saturdays of each month.

St. Louis, May 24th and 25th. Details from Kansas City office.

Des Moines, July 26th and 27th. Details from Kansas City office.

Chicago, 2022 Engineering Bldg., every Saturday.

Detroit, 1025 New Federal Bldg., every Saturday.

Cincinnati, sometime in May. Details from Detroit.

Columbus, Ohio, sometime in June. Details from Detroit.

Cleveland, sometime in July. Details from Detroit.

Buffalo, 514 Federal Bldg., last Friday of each month, and by appointment.

Pittsburgh, June 20th, 21st, and 22nd. Details from Buffalo.

Honolulu, Aloha Tower, every Monday and Saturday.

## Strays

A four-page booklet describing band-switching systems, with special reference to coupling arrangements in multi-stage transmitters, has been issued by the Ohmite Manufacturing Company as a supplement to their "Amateur Handbook."

It contains a variety of useful information including switching circuits for exciter units. The title is "Band Switching Circuits for Amateur Radio Transmitters." Requests for copies should be addressed to the company at 631 No. Albany Ave., Chicago. Ask for Bulletin 104.

Not all users of 866 rectifiers realize that the tube life is greatly decreased if the full 2.5 volts is not maintained on the filaments. It is not enough simply to measure the filament voltage at the transformer and let it go at that—contact resistance between tube prongs and socket may result in an appreciable voltage drop between transformer and filament, especially if the sockets are not designed to carry heavy current. To overcome this condition, W3AAJ suggests soldering a wire between one filament prong and the grid prong and a similar wire between the other filament prong and the plate prong right near the tube base, then doing the same on the corresponding socket connections. This puts two prongs in parallel for each filament terminal, thereby lowering the resistance. Measure the filament voltage right at the tube base if possible.

### "Abstracts and References" Now Available Separately

Heretofore published only as a part of the monthly English radio journal, *Wireless Engineer & Experimental Wireless*, "Abstracts And References" is now available separately in loose-leaf form printed on one side of the paper. This service has come to be recognized as the most complete of its kind available in English, covering the radio literature of the world. Not only are titles listed, but useful abstracts of appropriate length are given. For illustration, the January issue comprises 28 double-column pages (approximately *QST* size) including 354 titles under 13 headings. The subscription price of "Abstracts And References" separately is 20 shillings for one year. The magazine, *Experimental Wireless*, including these "Abstracts," has a subscription price of 32 shillings. Subscriptions should be sent to Iliffe And Sons, Ltd., Dorset House, Stamford St., London, S. E. 1, England.

At West Virginia University some tests were made to stop X-ray interference from QR'ing the radio lab. To coördinate the tests at the two points, about 1000 feet apart, two battery type portable 56-me. transceivers were placed in service by W8TI and W8DSJ. The tests were carried out with no delay.

You never know what sort of information you may get. W3MG, QSO a newcomer, asked him where he was keying his transmitter. Back came the reply: "Am keying transmitter in my bedroom here!"



### Overmodulation

In discussing 'phone problems with a number of fellows, both in conversation and by correspondence, it has been brought home to us that there are different understandings of the meaning of the term "overmodulation." Perhaps we have not made ourselves completely clear in the interpretation we have given it in previous *QST* treatment. Any modulation in excess of 100 percent is, of course, overmodulation. But this is not the exclusive case. Overmodulation may occur without reaching 100 percent, either positive or negative. Any instance of modulation exceeding the maximum degree of which a particular transmitter is linearly capable is overmodulation—just as any excess of excitation or power demand beyond the limit of which an audio amplifier stage is linearly capable constitutes overloading. An amplifier may have tubes rated as capable of 100 watts output without distortion but, because of improper voltages or circuit conditions, may be able to deliver only 50 watts without distortion. A transmitter might have a Class-C r.f. and Class-B modulator combination ostensibly good for 100-watt carrier output with 100 percent linear modulation; but actually, say because of insufficient Class-C r.f. excitation, that transmitter may be able to take only 50 percent modulation before running into non-linearity because of flattening of the positive peaks.

### Modulation Metering

Of even greater importance than agreement on a formal definition of overmodulation, however, is the problem of eliminating it in practice. Although there may be a few who deliberately and knowingly push their transmitters beyond the limit, with doubtful benefit to themselves and unquestionable damage to everyone else, most of us are innocently guilty. It now seems likely that the principal reason for this is that we have overlearned the classical "fundamental theory" that has come down through the years practically unchanged. This is the theory, of course, which shows nice sine-wave envelopes orthodoxly filled with radio-frequency zig-zags. We have perpetrated a number of them ourselves. It is on the basis of such an ideal wave that we have our figures of 50 percent increase in power at 100 percent modulation, 22.6 percent rise in antenna current, and so on. But we do not voice a sine wave. We use speech. Speech is not so simple. It

is very complex. In fact, the simplest practical equivalent of speech in laboratory-generated waves has been found to be two simultaneous equal-amplitude tones of different frequencies having a total amplitude equal to that of the single pure tone required for 100 percent modulation of the transmitter in hand. It is right here that we have to begin unlearning some of our cherished theory.

Audio level indicators, in general, measure the speech *power*, while percentage modulation is concerned only with *peak amplitudes*. While our two-tone speech equivalent has the total amplitude of a single tone that would give the same percentage of modulation, *the speech power is only half that of the single-tone wave*. (See 1933 Standardization Report of the I.R.E.) Hence (by the root-sum-square relationship) the r.m.s. current value of the two-tone speech equivalent is only 70 percent of what it would be with the single tone. From this, in conjunction with practical checks of various transmitter meter readings against the indications of a cathode ray oscilloscope working right on the r.f. output, we find the following practical modifications necessary:

1. Antenna r.m.s. current rise indicating 100 percent modulation on sustained speech is 15 to 16 percent, not 22.6 percent. With further allowance for the sluggishness of thermal meters, damping of the movement and the transient nature of speech, maximum antenna current rise is approximately 5 percent with normal talking.

2. Current-squared galvanometer scale reading increase is 25 percent, not 50 percent, for 100 percent modulation by sustained speech. With further allowances, as for the r.f. ammeter, the maximum increase accompanying 100 percent modulation by peaks of normal talking is approximately 10 percent.

3. Audio-frequency volume-level indicators having decibel calibration should read 3 db lower (half power) for sustained speech than for the single-tone level giving 100 percent modulation. Allowance for transients depends on damping of the movement, but the half-power level can be taken as the outside figure.

4. With Class-B modulators where the Class-B plate milliammeter is used as a modulation level indicator, the maximum reading with speech should be that corresponding to half rated power output for 100 percent modulation by a single tone. For instance, with a pair of 800's (100-watt rated output) modulating another pair in Class-C (200-watt plate input), the Class-B plate current

maximum with speech is 100 ma. (or slightly less) when it would be 200 ma. with a sustained single tone. It may run somewhat higher than half-value with zero-bias type tubes that take a fairly high no-signal plate current (such as the new 838's and RK-31's), but the half-current rule is safe and sane with all Class-B modulators biased nearly to cut-off.

5. Where a grid current meter in a Class-B modulator is used as the v.i., the half-current rule also applies generally. Remember that this grid meter, like the plate meter of the Class-B modulator, actually indicates the average value of full-wave rectified audio-frequency current, not the r.m.s. value of the speech current.

(Continued on page 64)

## Third Annual A.R.R.L. Field Day Contest to Test Portables

June 8th-9th

**T**HIS is the annual event which combines an outing, with the opening of the season for out-door radio activities. Starting Saturday, June 8th (4 p.m. local time) and ending Sunday, June 9th (7 p.m. local time) all U. S. A. and Canadian station owners are invited to schedule *field radio-operating activities*. The operation of portable transmitters and receivers afield is enjoyable; in addition it facilitates operator preparation to render constructive service in time of emergency; it encourages the development of equipment suitable for operation independent of interruptions of commercial power sources suitable for emergencies. *Only portable stations, actually operated in the field (away from the "home" address) are eligible to submit field-day scores.*

The object is for each "portable" station to work as many other amateur stations as possible—each different station counting *one point* toward a score. These stations may be locals, fixed stations, other portables, or foreign amateur stations. *Any or all amateur frequency bands may be used, voice or c.w. telegraph likewise.*

All points must be made in the contest period given above. The *log* of operation, claimed *score*, and data on *power* and *frequency* band used for each contact should be sent in promptly at the conclusion of the test. Please note what was used as a source of plate and filament power, along with the "watts input" to final stage, too.

Special credits: Scores may be multiplied by 2 if *either* receiver or transmitter is independent of commercial power supply, by 3 if *both* transmitter and receiver are supplied from an independent local source rather than from public mains. The following *additional* score multiplier will be used to give all stations an equal chance. If the power input to the final stage (plate current times plate voltage— $E \times I$ ) is:

- (a) Up to and including 20 watts—multiply score by 3
- (b) Over 20, and up to 60 watts—multiply score by 2
- (c) Over 60 watts—multiply score by 1

To comply with F.C.C. regulations for portable station operation, licensees in the U.S.A. have only to observe the instructions of pars. 387 and 384 as respects *advance notification* of the locations in which the portable will be operated to the Inspector-in-Charge of the district, and as regards proper station identification. In the U.S.A. not only 28- and 56-mc. band portable work is permissible, but operation in *any* amateur band. In Canada the new regulations (see page 67 May *QST*) permit portable sets to be operated *only* for 28-30 mc., 56-60 mc., or 400-401 mc. unless application to the Department of the Marine to secure the special permission necessary for portable work in other bands is made.

The League's affiliated radio clubs are all invited to encourage their members to build portables, and to arrange special Field Day activities for June 8th and 9th. Get together with your local ham club in plans for work with portables on these dates if you can. However, don't forget that every amateur is invited to take part, whether or not you are able to participate in club plans. Your portable transmitter can be a source of great pleasure for the whole summer season. Get it working now. Test it in the Field Day plans and *let us have your report*. Take it to the mountains or seashore later and make your summer complete. Keep an operative portable at hand *all the year*, so it will be where you can put it to work promptly in the event of disaster or public emergency. Don't forget to send your results for the report in *QST*—a postal card or letter will be most welcome, and please add any suggestions for the *next* Field Day.

—P. E. H.

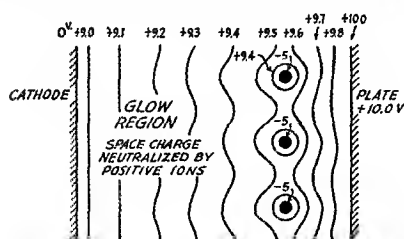
# A New Hot-Cathode Gaseous Discharge Amplifier and Oscillator

The Mercury-Vapor RK-100 Triode for Audio and Radio-Frequency Service at Low Plate Voltage

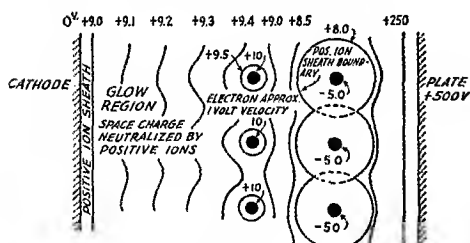
By J. R. Nelson and James D. LeVan\*

EVERY experienced amateur radio operator is acquainted with some of the bad effects of gas in a radio tube that is intended to operate as a high-vacuum tube. He is also familiar with the performance of grid-controlled mercury rectifier tubes as relay and control devices, which performance is made possible by the presence of

have been experimenting in this field. The Raytheon Laboratories, working on this problem for a number of years, have finally developed a type of tube in which this result is accomplished; that is, a gas- or vapor-filled tube which performs the normal functions of a high-vacuum tube as amplifier, detector or oscillator, and which (because of its gas filling) has characteristics and operating advantages not obtainable in high-vacuum tubes. It is the purpose of this article to describe a particular practical design (RK-100) of this new type of tube and to give a brief and approximate explanation of its operation.



FIELD IN GRID-CONTROLLED MERCURY VAPOR RECTIFIER  
FIG. 1



FIELD IN RK-100  
FIG. 2

gas or vapor. He has probably wondered why the advantages that the gas or mercury vapor gives in the latter case, such as ability to pass a large plate current with low voltage drop and to oper-

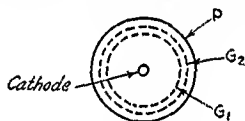


FIG. 3

ate with only a small control grid voltage, cannot be—or at least have not been—incorporated in the ordinary type of radio amplifier or oscillator tube. This idea has occurred to a good many who

\*Both of Raytheon Production Corp., Newton, Mass.

## HOW IT WORKS

The functioning of this new gas-filled amplifier tube can best be understood by comparing its operation with that of the common grid-controlled mercury rectifier. This rectifier structure is represented by Fig. 1. The anode current here cannot in general be completely controlled by the grid. Once the current starts it cannot again be stopped or decreased by making the grid more negative. The only function of the grid is to determine the instant at which the anode current will start.

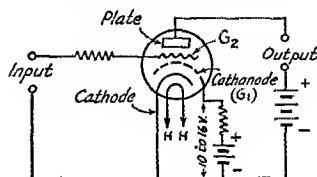


FIG. 4

The discharge can only be stopped by reducing the anode potential to zero. In Fig. 1 are pictured the lines of force in such a rectifier after it has started. Under these conditions the grid is immersed in a highly ionized space where the electron space charge is essentially neutralized by the positive ions. With negative potentials applied to the grid, a positive ion sheath will form around the grid whose thickness ( $x$ ) can be determined by Child's space charge equation:

$$X = 0.622 \times 10^{-4} \frac{V^{3/2}}{I^{1/2}} \text{ cm.}$$

where  $V$  = potential applied to grid  
 $I$  = grid current in amperes per sq. cm.

With  $-10$  volts on the grid and a current of  $10$  ma. per sq. cm. flowing, this gives a sheath thickness of  $.0035$  cm., which is very small compared to the openings in the usual grid. This thin sheath will, however, contain nearly the whole voltage drop

average. We can, therefore, think of  $G_1$  as a kind of cathode with electrons being emitted with 1-volt initial velocity. In fact, the electrode  $G_1$  might be called a "cathanode", since it acts simultaneously as the anode for the discharge from the hot cathode and as the cathode for the amplifying section of the tube.

Since the spacing between  $G_1$ ,  $G_2$  and the plate is small, and since the mean free path of an electron in mercury vapor at the pressures used is from  $10$  to  $20$  cm., electrons traveling from  $G_1$  to the plate hit very few molecules and thus create very few positive ions in this region. Thus the positive ion-sheath thickness around the grid wires can be made large and the grid allowed to maintain control of all electrons passing through it. Just enough positive ions are generated in this space to neutralize partially the electron space charge and give us a tube with a very low plate impedance. The short spacing and fine-mesh grid, coupled with the low ionization, give us high mutual conductance and high amplification factor. Furthermore, since the spacing between the

cathode and  $G_1$  can be made large as compared with that between  $G_1$  and the plate, we are enabled to make the grid and plate large enough to get ample heat dissipation without the electrode becoming unduly hot. Fig. 3 shows an end view of the element arrangement in one form of gas-filled amplifier and oscillator.

due to the grid and thus keep the grid from influencing electrons beyond the outer boundary of the sheath. Thus the region filled with highly ionized gas will project through the grid into the plate region in very much the same manner as would happen without the grid.

It is apparent, then, that if the grid is to remain in control of the electron stream, the positive ion sheath must be prevented from becoming so thin that the highly ionized region can project through the openings between the sheath boundaries; that is, we must make the sheath boundaries overlap. From Child's space charge equation we see that the sheath thickness can be increased greatly if we can find some way to decrease the current density of positive ion flow to the grid. This can be done by placing the grid in a region of low ionization, which is accomplished in the RK-100 tube by placing another screen electrode near the control grid and between it and the highly ionized space surrounding the cathode.

As shown schematically in Fig. 2, this electrode,  $G_1$ , is kept at about  $10$  volts positive with respect to the cathode and maintains the glow discharge. The control grid,  $G_2$ , is always maintained more negative than  $G_1$  and thus electrons are slowed up in the space between  $G_1$  and  $G_2$ . However, electrons shoot through  $G_1$  with about  $1$  volt velocity on the

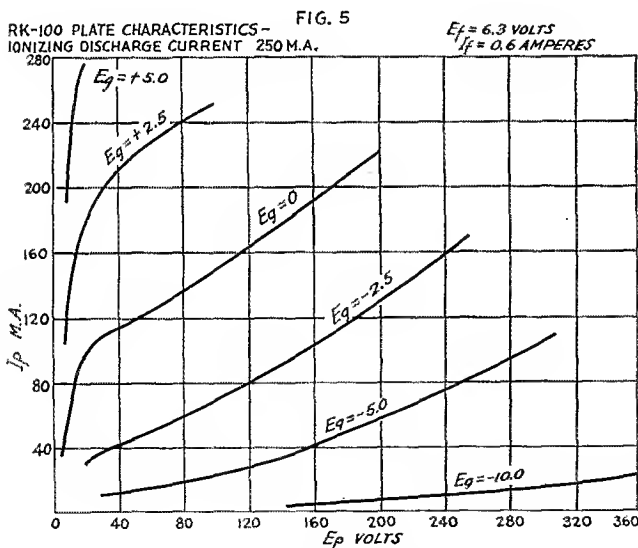
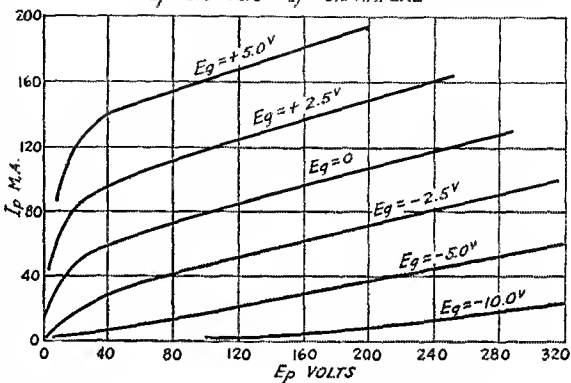


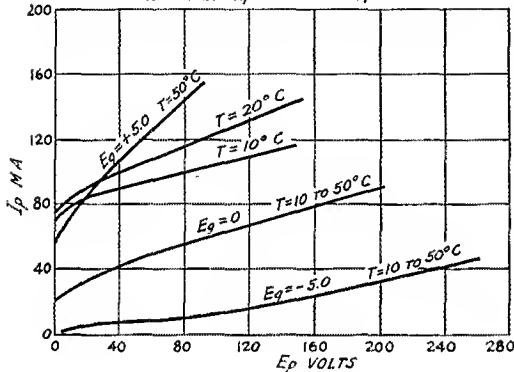
FIG. 6  
RK-100 PLATE CHARACTERISTICS IONIZING DISCHARGE CURRENT 150 M.A.  
 $E_f = 6.3$  VOLTS  $I_f = 0.6$  AMPERE



#### TYPICAL CHARACTERISTICS

The gas-filled amplifier tube is particularly useful at low voltages where conventional vacuum tubes are not very efficient on account of high internal drop. The introduction of gas to neutral-

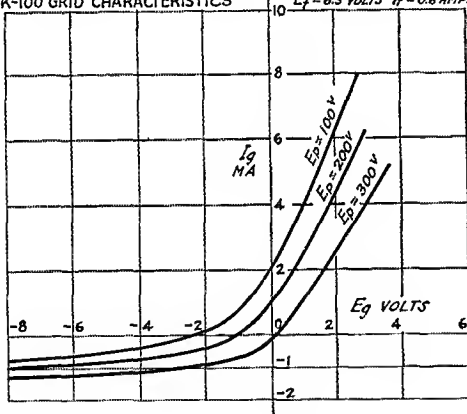
FIG. 7  
RK-100 PLATE CHARACTERISTICS FOR SEVERAL VALUES OF  
BULB TEMPERATURE.  $E_f = 6.3$  VOLTS  $I_f = 0.6$  AMPERES



ize partially the space charge lowers the drop considerably, thus making possible values of efficiency only obtainable with conventional tubes of the same cathode power at considerably higher voltages.

The characteristics of the tube with regard to the element voltages and the ionizing discharge circuit current are shown by Figs. 5, 6, and 7. Fig. 5 shows the plate family with the ionizing discharge current equal to 250 ma. Fig. 6 shows the results when the ionizing discharge current is equal to 150 ma. The plate current varies somewhat with the bulb temperature when mercury vapor is used as the gas. At the low values of current the effect of temperature is small but the effect increases as the plate current is increased, as shown by Fig. 7. For the RK-100 under the conditions of 100 volts on the plate, 2.5 volts negative bias on  $G_2$  and 150 ma. ionizing current to  $G_1$ , the amplification factor is approximately 50 and the mutual conductance 12,000 micromhos. With 250 ma. current to  $G_1$  the mutual conductance is increased to over 20,000 micromhos.

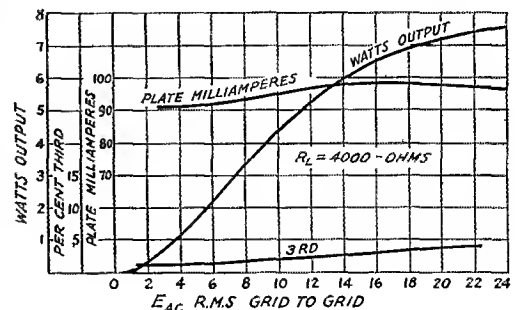
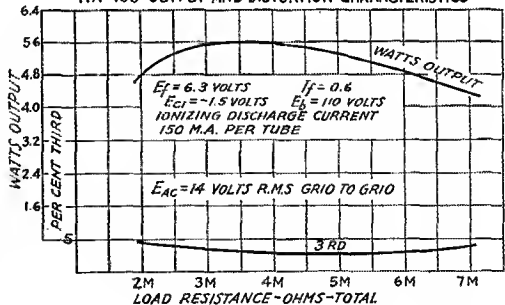
FIG. 8  
RK-100 GRID CHARACTERISTICS  $E_f = 6.3$  VOLTS  $I_f = 0.6$  AMPERES



While the control grid draws current at all times, the operation in practical circuits is similar to that of conventional vacuum tubes. The grid impedance is reasonably high with negative values; the grid current is constant and only changes as the grid goes positive, at which time the grid impedance decreases. The  $I_g$ - $E_g$  curves for several values of plate voltage are shown by Fig. 8.

The gas-filled amplifier tubes may be used in the same classes of service as conventional tubes. In fact, there are several possible applications where they may give considerable advantage. They may be used as audio amplifiers, either in

FIG. 9  
RK-100 OUTPUT AND DISTORTION CHARACTERISTICS



an intermediate or the output stage, or as r.f. amplifiers (Class A, B, or C), and as oscillators. The radio frequencies over which the tubes will amplify and oscillate cover the range now in common use, including at least as high as 150 megacycles (2 meters). This is contrary to the commonly accepted idea that gas filled tubes are very limited in their frequency range.

The results obtained when tubes of the particular design described here are used in the audio output stage are shown by Figs. 9 and 10, showing that the use of ionized gas in tubes, with its resultant advantages, does not introduce distortion. The curves were taken under ideal conditions and show the capabilities of the tubes. It is evident that the results are very good for

(Continued on page 88)

# H A M D O M



**T**HERE are few men who have done more for amateur radio than has Paul M. Segal, W3EEA, general counsel of the League. Starting



out as 9EEA in Denver in 1922, a young attorney newly fitted out with Denver University's LL.B., he quickly reached a position of eminence in the Rocky Mountain Division and was sent to the A.R.R.L. Board in 1924. That same year he became deputy district attorney, which post he held until he joined the

F.R.C. as assistant general counsel during 1929. The end of that year he entered private practice in Washington, specializing in radio matters. Simultaneously, he resumed his post as general counsel of the League. For us, he has prosecuted a number of cases which have established precedents in radio jurisdiction, notably in connection with the Wilmore (Ky.) Ordinance. He went to Madrid as one of our representatives in 1932; to Mexico City to the North American Regional Conference in 1933. He has written a number of legal articles and pamphlets, and enjoys an enviable standing in Washington legal circles. W3EEA is remotely-controlled over a 4.99-mile leased wire, operating on 3.5-, 7- and 14-mc. e.w. exclusively, with 1-kw. input. A far cry from the early unlicensed spark of 1911-12! Segal is a member of the A.R.R.L., L.M.R.E., and U.R.E.—and if that does not guarantee his amateur status just read over once again, at the beginning of the *Handbook*, the "Amateur's Code" which he wrote in 1927.

**B**ENNETT R. ADAMS, JR., W4APU, was elected to the A.R.R.L. Board of Directors by the members of the Southeastern Division in a special election this past winter to fulfil the unexpired term of J. C. Hagler, Jr., who resigned because of the pressure of business affairs. W4APU comes to the Board with a splendid amateur record. B.c. interest in 1922 progressed to a ham ticket and the call 4EV in 1926 and the operation of 4AV of the Georgia Tech Radio

Club, of which he became president. He went to work for A. T. & T. upon graduation in 1929, and since then has climbed poles, worked the toll test-board, monitored programs, and done engineering work on the inductive interference problem. In early 1931, W4EV having expired, W4APU was acquired and has been continuously active ever since on 3.5-, 7- and 14-mc. c.w. A small transmitter is operated on each band, to provide complete flexibility; one of them is now re-vamped to include a modulator for 'phone work. W4APU is O.R.S., R.M. and O.B.S. A member of the Birmingham Amateur Club since its inception, its president for three terms, he is now vice-president. He operates on Trunk Line "J," and runs a traffic total of 100-300 per month. He holds a commission as 1st Lieutenant in the Signal Reserve, U. S. A. His fundamental loyalty is to his section and his division, and he is ever a booster for Alabama and the Southeastern.



**F**RED SCHNELL'S a busy man.

We've wanted to display him in *Hamdom* for a long while, but it was only recently that we caught him unawares on a flying trip to Hartford, and got the real low-down. His life has been spent in radio. He copied the first message from Rome, Italy, to President Wilson during the war, while at Belmar, N. J., in 1918—the first two-way radio between Italy and the U. S. He copied the peace acceptance message from Germany in 1918, and two days later transmitted the first message to Germany after the close of the war. He was chief op on the U.S.S. *George Washington* when President Wilson attended the peace conference in France. Following this spectacular war career, he joined the League headquarters staff (of three!) as Traffic Manager in 1920. In 1923 he and Leon Deloy were the first amateurs to work across the Atlantic Ocean. In 1925 he traveled to Australia with the Fleet and showed the Navy the value of the short waves. Coming back one of the most famous of America's



(Continued on page 82)



# A New 100-Watt Type Zero-Bias Transmitting Tube

## The 838 Class-B Modulator and R.F. Power Amplifier

**A**LTHOUGH designed primarily for use in Class-B audio power amplifier or modulator circuits in which a pair has power output capability of a quarter kilowatt or more, the new 838 triode just announced by RCA also offers particular operating advantages in r.f. oscillator and power amplifier services as compared to older types, such as the 203-A, of the same 100-watt plate dissipation rating. In fact, since it has generally similar circuit requirements, it can be used to replace the 203-A in most applications with no more than minor modifications in the set-up. The 838 takes the same socket as the 203-A, 211 and similar tubes, the same filament supply voltage and current, and has corresponding plate voltage ratings. The tentative general characteristics are as follows:

Filament voltage (a.c. or d.c.) . . .	10 volts
Filament current . . . . .	3.25 amperes
Direct interelectrode capacitances (Approx.):	
Grid-plate . . . . .	8 $\mu$ fd.
Grid-filament . . . . .	6.5 $\mu$ fd.
Plate-filament . . . . .	5 $\mu$ fd.
Bulb . . . . .	T-18
Base . . . . .	Jumbo 4—Large Pin

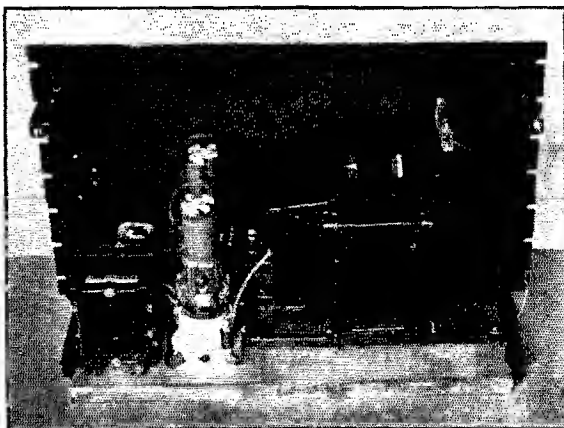
### CLASS-B AUDIO POWER AMPLIFIER AND MODULATOR

The 838 is especially interesting as a Class-B modulator in which service it operates at zero bias. The grid is designed so that the amplification factor of the tube varies with the amplitude of the input signal. The ratings, and experimental tests, show that the tube has the desirable feature of requiring even less driving power than the 203-A. Tests using a pair of these tubes have been made with the modulator unit shown in the photograph, the driver stage using a pair of 2A3's and the Class-C amplifier being an 849 operating with 500 watts input at a plate voltage of 2000 volts. The modulator plate voltage used was 1250 volts, at which the 838's have a rated audio output of 260 watts—which output they deliver without any difficulty.

The schematic circuit of the modulator is the same as that for the 203-A's (given previously in several *QST* articles) with the exception that the secondary center-tap on the input transformer is connected directly to the filament center-tap and minus B, rather than to a bias source.

Maximum ratings and typical operating conditions for Class-B audio service are as follows:

D.c. plate voltage . . . . .	1250 max. volts
Max. signal d.c. plate current (per tube)* . . . . .	175 max. milliamperes
Max. signal plate input (per tube)* . . . . .	220 max. watts
Plate dissipation* . . . . .	100 max. watts
Typical operation (2 tubes):	
Filament voltage (a.c.) . . . . .	10 10 volts
D.c. plate voltage . . . . .	1000 1250 volts
D.c. grid bias voltage . . . . .	0 0 volts



THE TEST MODULATOR USING TYPE 838 TUBES

Peak a.f. grid input volt. (approx.) . . . . .	90	90 volts
Zero-sig. d.c. plate cur. (per tube) . . . . .	53	74 milliamperes
Max-sig. d.c. plate cur. (per tube) . . . . .	160	160 milliamperes
Load resistance (per tube) . . . . .	1900	2800 ohms
Effective load resistance (plate-to-plate) . . . . .	7600	11,200 ohms
Peak driving power (approx.) . . . . .	5	5 watts
Max. sig. power output, approx. (2 tubes) . . . . .	200	260 watts
* Averaged over any audio-frequency cycle.		

As a result of the zero grid bias characteristic of the 838, grid current is drawn on any input signal. Hence, the input transformer can be designed for operation under approximately uniform loading conditions so as to give excellent frequency response. Of course it should also be designed to handle the required input power for the strongest signal. With a pair of 2A3's in a push-pull driver, the input transformer turns ratio

(Continued on page 74)

# A Portable Receiver That Delivers the Goods

By Floyd L. Vanderpoel, W1WR\*

**N**EARLY every amateur I know would like to own, at least at times, a really satisfactory portable receiver. Not necessarily one that he can carry around in his pocket, but one that can easily be carried in a car, is sufficiently rugged to stand considerable rough handling and which can be set up quickly when away from the home station without the necessity for taking time to rig up an antenna.

A number of years ago, before the days of high-frequency and ultra-high-frequency transmitters, I built just such a receiver. It worked very well on the 1.75-mc. and 3.5-mc. bands but on the higher frequencies, which came into general use later, it was practically useless. At that time, after finishing the receiver, I had a leather case built to carry it (this was before the depression).

Last summer I decided that the old receiver would have to be junked in favor of a new one of more modern design. The new receiver had to fill the following requirements: First, it must fit into the old case and at least leave room for the "B" batteries. Second, the initial cost must be low.

Third, the upkeep must be low. Fourth, it must be sensitive and still tune sharply. Fifth, it must have band spread. Sixth, it must cover all amateur frequencies from 1.75 mc. to 28 mc.

At first glance this seems like quite an order to fill. After going over all the available circuits and designs very carefully it narrowed down to just one type of receiver—the good old-fashioned regenerative detector and one stage of audio. I therefore decided to build one along the lines of the receiver described in the article "What About the Simple Receiver" in the June 1934 issue of *QST*.

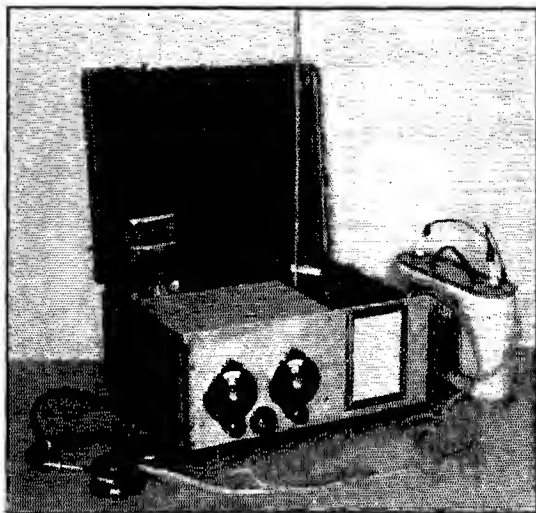
The leather case has the following inside dimensions: width 14 inches, depth 12 $\frac{3}{4}$  inches and height 6 inches. The cover is built with two sets of hinges, the set at the back being the conventional type and those at the front of the loose

pin type so that the cover over the dials may be entirely removed. There is a half-inch partition across the case 8 inches from the front. The compartment behind this is exactly the right size to hold four No. 5308 45-volt Burgess "B" batteries. In this compartment there is also a "B" battery switch mounted on a small aluminum panel, since in this particular circuit the "B" battery is shunted by a voltage divider in the receiver and the batteries would be discharged quickly if one were not used.

Type 76 and 6D6 tubes are used in this receiver. The heaters draw only 0.3 ampere each and they may be operated either from an Ever-ready Hot Shot battery or from the car storage battery if the set is used outside. Incidentally, a single four-cell Hot Shot battery has given me many hours of very satisfactory service. If the receiver is used in the home station the heaters may also be operated from a six-volt transformer. I have never tried this, since it would necessitate some changes in the heater wiring, viz., disconnecting the heater leads from ground and install-

ing a center-tapped resistor, as shown in the original circuit in June *QST*.

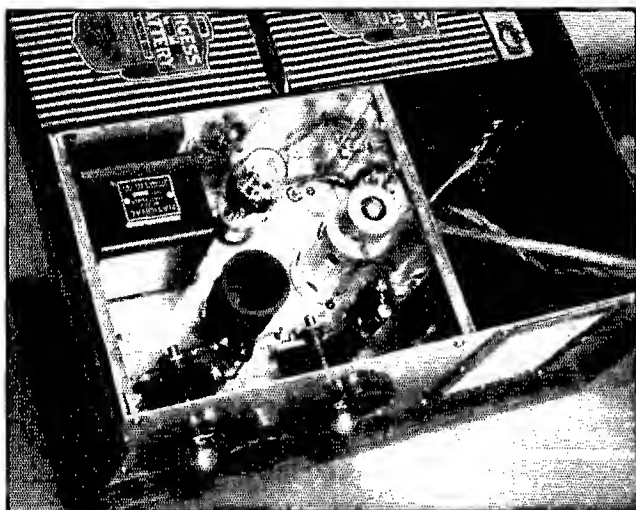
The receiver itself is built in a  $\frac{1}{16}$ -inch aluminum box 8 $\frac{1}{4}$  inches wide, 6 $\frac{1}{2}$  inches deep and 6 inches high, with a sub-panel or base 1 $\frac{1}{2}$  inches from the bottom. The front and sides of the box are fastened together with brass machine screws and brass angles. The back panel is bent up at a right angle and bolted to the sides. The front panel is carried the entire width of the case in



THE COMPLETE PORTABLE OUTFIT

order to make an extra compartment for carrying coils, headphones, "A" battery leads, ground and antenna connections, etc. The weight of the entire outfit, including the antenna, "A" and "B" batteries, phones and other accessories, is 39 pounds. This could be cut down at least one-third and possibly one-half by using an aluminum box as the carrying case and employing small-size "B" batteries. Because of the low plate cur-

\*North St., Litchfield, Conn.



AN INSIDE VIEW SHOWING THE LOCATION OF THE BATTERIES AND HEADPHONE COMPARTMENT

rent drain I am sure that the smaller batteries would give excellent service.

The circuit diagram of the receiver, shown in Fig. 1, is the same as that given in the article referred to with the exception of the heater wiring, so need not be given detailed treatment here. Coils for all five bands have been wound, following exactly the specifications in the original article. It is of interest to note that all coils gave the band-spread and frequency-coverage specified, and that no cut-and-try was needed to make them come out right.

The portable antenna is rather interesting. It consists of a specially-constructed 9-foot telescoping fishing pole, copper-plated. This is mounted to the side of the receiver near the back. A battery clip and a short piece of flexible wire connect it to the receiver. Usually no ground connection is used at all, the 3-foot "A" battery lead taking its place. There is a binding post on the side of the receiver so that a ground can be used in case the operator wishes to do so. There is also a 10-foot "A" battery lead carried so that the car battery may be used and at the same time the receiver moved a short distance away from the car.

Practically all reception has been done on the 7-mc. and 14-mc. bands, since the portable antenna seems to be best suited for these frequencies.

For lower frequencies a longer antenna would give more satisfactory results. The antenna system plays a most important part in the operation of this type of receiver, and I believe that with a little experimenting almost unbelievable reception could be accomplished with this little two-tube. As an example of what can be done I mention the following. One day last summer I built an antenna having an approximate fundamental of 25 meters in order to listen to one of the short-wave broadcasting stations of the British Broadcasting Corporation. The antenna was parallel to the ground and less than 9 feet above it. At the middle of the antenna the wire was twisted into a single turn which was put inside the 14-mc. coil, no ground being used. The voice and music from the

British Broadcasting Station was so loud, with

(Continued on page 84)

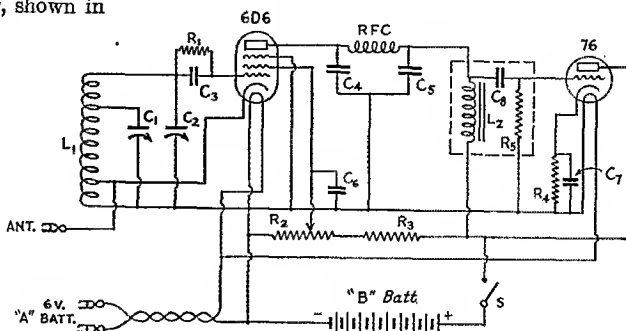


FIG. 1—CIRCUIT DIAGRAM OF THE PORTABLE TWO-TUBE RECEIVER

Polarity of "A" battery connections is not important.

C<sub>1</sub>, C<sub>2</sub>—100- $\mu$ fd. midget variables.

C<sub>3</sub>, C<sub>4</sub>, C<sub>5</sub>—100- $\mu$ fd. fixed mica condensers.

C<sub>6</sub>, C<sub>7</sub>—5  $\mu$ fd. or larger.

R<sub>1</sub>—5 megohms.

R<sub>2</sub>—50,000-ohm potentiometer.

R<sub>3</sub>—25,000 ohms.

R<sub>4</sub>—2000 ohms.

RFC—Universal wound short-wave choke.

L<sub>2</sub>, C<sub>8</sub>, R<sub>5</sub>—Screen-grid coupler (National Type S-101). Suitable values are; L<sub>2</sub>, 500 henrys; C<sub>8</sub>, .01  $\mu$ fd.; R<sub>5</sub>, 0.5 megohm.

Frequency Range	Coil Data		
	Total turns	Cathode Tap	Band-Spread Tap
1450 to 3400 kc. (1.75).....	54 1/2	3 1/4	29 3/4
3050 to 7100 kc. (3.5).....	27 1/2	1 1/4	11 3/4
6100 to 14,200 kc. (7).....	13 1/2	3/4	4 1/4
10,600 to 24,000 kc. (14).....	7 1/2	1/2	1 1/4
18,000 to 41,000 kc. (28).....	3 1/2	1/3	1/2

All coils are wound with No. 24 d.s.c. wire on 1 1/2-inch diameter forms, the length of the coil being 1 1/2 inches in all cases. The figures in parenthesis after each frequency range indicate the amateur band for which that coil is used. The taps are counted off from the lower or ground terminal. Assuming that the tuning dials have 100 divisions and that the 0 end of the scale represents maximum condenser capacity, the setting of C<sub>3</sub> to give amateur band coverage on C<sub>1</sub> will be approximately as follows, using appropriate coils: 1.75 mc., 44; 3.5 mc., 38; 7 mc., 28; 14 mc., 54; 28 mc., 78. See "What About the Simple Receiver," June, 1934, QST for further details of construction.

# Trunk Line "C"

## A Unique Approach to an Old Problem—A Group of Outstanding Hams

By James M. Bruning, W3EZ\*

**T**HERE has been an A.R.R.L. Trunk Line "C" handling the traffic of amateur radio along the Atlantic Coast for twenty years. Many amateurs whose names are now historic in ham radio have served on that "cleared wire" route—under Eastern District Manager Hebert before the war, during the early post-war years, and then after the big reorganization in 1931. A record of vigorous achievement has been piled up by A.R.R.L. Trunk Lines. Line "C" is among the foremost.

With the advent of "one spot" frequencies,<sup>1</sup> considerable improvement in operating technique was possible. The suggestion of W3EZ that the trunk line operate as a net was favorably received. Accordingly, operation "as a net" was adopted February 1, 1935. From three members, the net has grown until it now includes eight of the ten Atlantic Coast trunk stations. It goes on the air six days a week at 6:45 p.m. on 3665 kc. and is in operation from thirty minutes to an hour. W3EZ is the control station. For the benefit of any not yet acquainted with the method this is as follows: The control station calls the net stations in a predetermined order and makes a record as each member comes back to give his list of traffic. The control then releases those who are "QRU" and directs the remainder to "clear" each other, starting with those having least traffic. The particular order in which the members QSO each other may vary at times depending on weather or interference conditions, engagements for the evening, etc. Each station is released as soon as cleared. The main advantage of this system is that each member sends directly to any other member of the net instead of through the usual station-to-station relay. If unable to contact directly, either the control or someone delegated by the control steps into the picture and relays to the proper destination. This not only speeds up the travel time for messages, but also eliminates those errors which creep in from too many intermediate relays.

Previous to the net style of operation it took

\* Trunk Control station, 339 West Lancaster Ave., Haverford, Penna.

<sup>1</sup> Trunk C was furnished crystals for one-spot operation, courtesy of Murrill and Murrill. Other official A.R.R.L. Trunk Lines were furnished crystals courtesy of Billey Electric Company, and American Piezo Supply Company. The A.R.R.L. Trunk Line system went "one-spot" at the start of the 1934-1935 season.

nearly six days to relay messages through the ten stations from Maine to Florida. Working as a net, this time has been cut until we have reached the point where all Atlantic Coast traffic is cleared the same evening. The net handled 182 separate trunk messages in February and 249 in March. On March 12th we cleared 24 messages in one hour flat—and not a "rubber-stamp" in the lot. The high spot of our efforts to improve the service was reached on March 28, 1935, when Trunk Line "C" flashed a message from VE1FL, Chester, Nova Scotia, down the line to W4DIO, Key West, Florida, and returned an answer to VE1FL in a total of NINE minutes from start to finish! This is a mark for Western Union to shoot at.

The members of Trunk Line "C" wish to express their gratitude to fellows such as W1BFR, W2CTT and W8DSS who so willingly moved their frequencies away from 3665 kc. when notified that they were causing QRM. Such coöperation from any station on or near 3665 kc. from 6:45 to 7:45 p.m. "trunk hour" is greatly appreciated by the "gang."

### THE GANG

They are:

John Apostolos, W1ERQ, is the capable "holder-downer" of the Manchester, New Hampshire post. "Tim" is twenty-two years old and started in the radio game in 1933. Despite his brief career, his progress has been rapid. W1ERQ can boast of a fine signal (worked D4BAR on 80) and a fist developed on a home-made bug. Tim has worked 160 meter 'phone but gets his biggest kick on 80 meter c.w. He does radio service work as a side line. He is an ORS, TLS and RM.

Alice Fitzgerald, W1FRO, puts Watertown, Mass., on the radio map. Alice is only eighteen, but has ability far beyond her years. Started to learn radio in 1932 as a result of a short-wave article in an aviation magazine. Was soon licensed, and the thrill of handling her first message converted her into a traffic pusher. Alice has a nice fist and copies better than 25 w.p.m. Anyone who doubts the operating abilities of a YL should contact her sometime. She holds appointment as ORS, OBS, and TLS. Favorite sports are swimming and rifle shooting.

Ed Gustafson, W1DOW, stepped into the shoes of W1AMG and has been doing notable work ever since in Bristol, Conn. "Gus" learned the code in 1931, entered ham radio and became an ORS the

next year. One of his many thrills came when he was testing out a new receiver. No sooner had the juice been turned on than W1ASY came pounding in with his Vermont Flood QRR. Ed's stock went way up. Gus is secretary of the Bristol Radio Club and editor of the B.R.C. Scandal Sheet. He is an ORS and TLS. In his spare time Gus goes in for bear hunting and target shooting. His collection of twenty or more shooting medals indicated his expertness in fields other than radio.

Emal S. Hillery, W2GNK, did some notable brasspounding before moving to Jersey City, N. J. "Em" started to eat up Morse on the Erie R.R. in 1911. Worked for United Press, Associated Press, Western Union, Postal, and ended up punching tape for Consolidated Press in N. Y. C. Advent of teletype caused him to leave the Morse game and go back to his former sideline—printing. Now operates a linotype machine for the Bayonne (N. J.) Times. Was first bitten by the ham radio bug in 1919, but didn't get on the air until 1925. Used to pilot an aeroplane but had a bad crash and now does his air-flying over Trunk Line "C." Makes the wife keep supper waiting while he operates the Comet Pro and pre-selector with his left hand and 225 watts of XPDC with the right. Is an ORS and TLS. Hobby is traffic and more of it.

J. M. Bruning, W3EZ, is the Pennsylvania outlet for the line and trunk control station. Jim first became interested in wireless just before the war, and soon after came on the air with a buzzer-excited antenna, was promoted to the Ford spark coil stage; graduated from Philadelphia Wireless School in 1923 and acquired a commercial first class ticket. He built two of the original Pennsylvania State Police transmitters, WJL and WBR. Operated WJL during enlistment and learned to cuss as a sideline. Became head of their Criminal Identification Bureau at Troop "A." He now works for the Bell Telephone Co., and has been everything from clerk to wire chief. Has a Class "A" ham ticket and uses 75 meter 'phone but likes 80 meter c.w. better. Is a member of the A1 Operators Club, ORS, TLS, and RM. Is married, and his age is on the dark side of thirty. Hobbies are pounding the piano (self-taught) and pounding brass.

Eppa W. Darne, W3BWT, keeps the Washington, D. C., senators posted on what's new in radio. Ed is a consistent member of the monthly brasspounder list. Started in amateur radio at the tender age of nine, back in 1911. Has a great first and a fine signal. Is alternate Net Control for WLM, using the call WLMB. Is getting ready to blast the ether with a 1 k.w. job some of these days. Not only is an A.A.R.S. man but also holds appointments of A1 Operator, ORS, TLS, and RM. Is married, but still finds time to keep the traffic moving along. Hardest job in the world is to get a schedule with him, but once you do it is yours for keeps.

Fred L. Hamilton, W3BYA, of Clifton Forge, is the N.C.S. for the A.A.R.S. in Virginia. Fred started building B.C.L. sets in 1922 but didn't get his ham ticket until 1931. Fred still does service work as a sideline. Has tried 'phone, but got R9 reports from the neighbors so went back to c.w. on the 20, 40 and 80 bands. Is a member of the A1 Operators Club and is an ORS, TLS and RM. Is single at present but hopeful.

H. L. Caveness, W4DW, is a professor of chemistry at the Raleigh, North Carolina, State College. Helped build a telegraph line in 1910. Built a broadcast receiver in 1922. Saw an amateur transmitter in 1928 and caught the fever. Started to climb in amateur circles and went through the grades of A.A.R.S., U.S.N.R., ORS, TLS, SCM, and became director of the Roanoke Division. Holds an A.B. from Trinity and an M.A. from Duke but talks the ham language fluently. Is anxiously waiting to see if his brand-newest daughter will first say ma-ma or dah-dah.

William C. Shelton, W4ASR, is the Daytona Beach, Florida, member. Bill was exposed to spark radio in 1919 and never recovered. Learned to copy press and weather before his 'teens. Works 80 and 40 meter c.w. and 75 and 20 meter 'phone. Is a member of the Florida 'phone net known as the "Knights of the Kilocycles." The radio shack is a 10' by 15' house in the back yard. Needs larger quarters to hold all the junk. Bill is an OBS, ORS, OPS, OO, and assistant director for the Southeastern Division. Outside of radio, Bill works for the A. T. & T. Co. as Morse operator and transmission man. His other hobbies are surf bathing and the junior op, aged three.

Richard E. Fricks, W4DIO, is the Key West, Florida, terminal. Dick enlisted in the U. S. Navy in 1928. Went to Naval Radio School and after completing the course was transferred to sea. As a Navy radioman Dick has been all over the world. Is now doing shore duty at the Key West Naval radio station. Traffic is an old story to Dick, and he likes nothing better than to take the weights off the bug and "let 'er go." W4DIO was the Florida station coöperating to make the nine-minute two-way relay from Nova Scotia possible.

## Michigan State Convention

### Central Division

June 22nd, Hotel Northland, Marquette, Mich.

WITH the full approval of the Director and the A.R.R.L. Executive Committee, the Marquette County Radio Amateurs will hold their first convention, and the Hotel Northland at Marquette will be the center of activities on June 22nd.

The experience of previous "hamfests" will enable the committee to give every one attending

(Continued on page 86)

# A.R.R.L. Copying Bee Results

**F**RIDAY, December 14th, might just as well have been "Friday, the 13th," judging from some of the results of the first A.R.R.L. Copying Bee! "Alphabet soup" has nothing on some of the copies submitted. Hi! But ask any ham who took part, if you don't believe it was a lot of fun—and a whale of a lot of good code practice. Just glance at the texts of the messages transmitted, which are printed at the end of this report. It was a real test to try to make perfect copy of these messages at about 22.5 words per minute.

No matter how difficult a competition may seem there always emerges a victor. In the Copying Bee three operators made perfect copy! Duplicate awards of the silver loving cup trophy for the best copy go to V. W. Post, W5ESK (100% perfect copy of W2AYN-9), John F. Hoover, W6GAH/W6ZG (100% copy of W6ZF), and Fay Gehres, W9AIN (100% copy of W1MK). These men can copy code, and deserve the congratulations of all who appreciate ability!

Three different texts were transmitted, one from W1MK, one from W2AYN-9 and W9UZ, and one from W6AM and W6ZF. It was only necessary to submit one copy, the copy which the operator considered "best"; 102 operators made their best copy from W2AYN-9, 78 from W1MK, 43 from W6AM, 19 from W6ZF and 6 from W9UZ, a total of 248 participants. Two copies were received without the names of the contestants and were not counted.

Each text consisted of 50 words or groups totalling 384 characters (letters and figures). In grading copies each word or group was considered either "right" or "wrong," and each one right counted 2% toward a possible 100%.

The Copying Bee is something new in A.R.R.L. activities and has been greeted with much enthusiasm. Unlike previous "receiving competitions," the text to be copied was very "tricky," being composed of difficult and misspelled words, letter and number combinations, etc. It was a challenge to any operator!

## The Scores

Participants are grouped by transmitting stations, showing from which station each operator made his "best copy." Operators are listed in each group according to accuracy of copy within that group. For final ratings to determine "winners" the scores of all operators in all groups were compared. Operators whose calls are in italics are the highest rating participants in their respective A.R.R.L. sections.



Those making their "best copy" from W2AYN-9: W5ESK 100% W2ALB 96% W3AWQ (at W8YA) 92% W4BRG-W8HS 90% W6BMC-W7ELF-W9KJY 88% L. J. McKnight (at Ft. Omaha, Neb.) W4IHF-W7AJ-W7EET-W8CDK W1IGB-W3AKB W1ALJ-W5BXA-W7BVE-W9DBM W4KA-W7IG-W8BEN-W9ARE-W9DJA W8IKZ-W9DOU W1MK (Hal) W2DBQ-W2GKB-W8AQ-W9AHH W2DG-W6WQ-W7RT-W9DHH-W9DOP W2CBN-W2GNK-W9ABB W1AJK-W1DJQ-W4APU-W8MJR-W9AQD W1FRO-W1ICA-W2BCB-W8ABX-W9GGR-W8IUY-W8KJW-W9ES W1CTI-W1FNM-W1GBY-W9IEL W8FXF-W9OSO W8IWT-W9CWR-W9FFD W7DLN-W7DP-W8DKE-W9GGG VE2FG-W4COV-W5ZM-W5CDM-W8IFM-W9CFL W8APN-W9RJP W8ISK-W9CEX-W9HNP-W9HTU W9PTE W1AAY-W2CKQ-W3EZ W8AFE-W8DBX-W9EVQ (Harmon Weeks) W8SS-W9EFK W4CIR-W8DM-W9EVQ (Irvin Weeks) W3EIM-W7AF-W8AYO-W9NXG W9DQD W3EQP-W4BDT W1DBU-W2DRC-W7AAT W9GFN W8KGG W2HBO.

Those making their "best copy" from W1MK: W9AIN 100% W5AL-W9GAD 98% W9LHY 96% W5NW-W9ERU-W9EZQ-W9FNQ 92% W9CDM 90% W9ANV W9AEX-W9CDV-W9INM W7AFS-W9QV-W9SES W1JI (aboard ship outside N.Y.C.)-W2CL, W9D-W1DUK-W9CGY-W9DGS-W9KUI W4AUE (copied in Venezuela)-W9GNU W5BCW-W8FYF-W9PJT W1ASP-W1FAK-W9KCG-W9OMA W1BQS-W9BFW-W9CSJ W1GBD W2BJX W1EOB-W1BVG W3ADE-W8HWH W8KWA W2DIJ-W5BKJ W5BRQ W2AVS-W7CZY-W8LSO W5CEZ-W5EHZ-W9NZE W2ATM-W9MSY (at W1UY) W6DQR W1FOU-W9I2D W9IGZ W9GYB W8EUV-W9MZD W9EMS-W5EEL Mrs. W5CDM W1FYO-W9KJC W9GEN W4LG-W4MJ-W9IQW W1HKE-W3EIL (Chester R. Martin) W0CMJ W1EBT W1FPF-W3EIL (Edw. H. Martin) W7AXN W1ATF-W1FWT.

Those making their "best copy" from W6AM: W7MY 92% W6JVH 90% W6DBQ 88% W6FIP W6GVU-W6CII-W7CZX W6B9Y (R. E. Farrell)-W6CLV W6DYZ-W9ENU W6QA W5KUG-W6CIR W6BNI-W7ESJ-A. W. Watkins (ex-1CHQ) W5DF W6CXX-W6IOX W9RLZ W7AZY-W7BXQ W6EDW-K7DYF-W7ESL W5BMU-W6KTQ W6EGJ W7WY W6EYR-W7BZJ W7BDS-W8CUG W8MTZ W8LUG K8CRU-W6JZJ-W7CRS-W7CWN W9SWP W7RE W6DNY.

Those making their "best copy" from W6ZF: W6GAH 100% W6GXV 86% W6IKM 84% W7LP 82% W6SLQ W6CBY W4CZC-W9HME (aboard ship at San Francisco) W8JNL W1ECY-6 W4LN W4GX W6BQO W6AQE W7DWQ-W8MUU W7AVL W1FXB W3BXE.

Those making their "best copy" from W9UZ: W9GUN 98% W7JE 82% W9DXZ W9PYH CM7CR W9SGY.

The text transmitted from W2AYN-9 and W9UZ: SENTIENT ENTENTE UTTER TRANSCONDUCTANCE EVASIVE JUJUTSU KHANATE QUOIT OINTMENT MENTION ONION ONTOGENY REENTER PAFNIR IRITIS TMESIS CENTENNIAL SENTIMENT SEDIMENT MENDACIOUS OUBSTER STERLING LINGERIE AERIAL ALUMINUM NUMB TOMFOOLERY ERRONEOUSNESS PTESIAN JANISSARY JINRIKISHA SHAH NIFLHEIM SELENE TETTER 7347MS MIMETIC ZEUGMA UN-NUMBERED ZENANA NATANT TANTAMOUNT ANTECEDE EDELWEISS XANTHIPPE PEPPERMINT MINIMIZE ZETHUS NAUSICAA HEXAHEDRON

The text transmitted from W6AM and W6ZF: MISSTRESSSHIP TETEATETE DEBILITATE PUNKSU-TAWNEY MUTAUL ZIGZAG YTTERRBIM MAMMA ENSIFORM XYST MNEMONIC ENFEOFF BREVET XYLYLENE TSETSE BREE SHIRR ATAXIA HESSIAN ATTESTATION OSSEOUS TATARIAN UTTLANDER WHEEEZE CHLOROPHYLL DEVISEE MISSISSIPPI

(Continued on page 98)

# What the League Is Doing

League Activities, Washington Notes, Board Actions—For Your Information

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## 1935 Board Meeting

The Board of Directors of the American Radio Relay League held their regular annual meeting in Hartford on May 10th and 11th. All the pending affairs of amateur radio were gone over carefully, many important decisions taken, policies outlined, recommendations made for changes in amateur regulations, committees established and orders issued. This is an account of the highlights of the sessions.

To us the distinguishing characteristic of this meeting was the thorough advance preparation which had preceded it. From an experience with some dozens of A.R.R.L. Board meetings we unhesitatingly proclaim this the best-prepared one we have ever witnessed. Not everyone seems to understand the huge amount of preparatory work which precedes the meeting of our Board. Early in April of each year the officials of the League file with the directors comprehensive reports both on the work of the preceding year and on the status of pending matters. At about the same time, each director commences a survey of his own area to obtain amateur reaction towards the questions of the moment, to equip himself to speak accurately for his territory. Early in the annual meeting each director makes a report, for the information of all the others, on conditions and sentiment in his division. Thus a very thorough groundwork is laid for the intelligent examination of affairs. This year over two hours were devoted to hearing the directors' reports and mutually exchanging information as a factual background for the meeting. Every director was present except the Vice-President, who unfortunately was ill; and the Board also had before it, as aides and to receive instructions, the secretary and assistant secretary, the treasurer, the communications manager, the general counsel and the technical editor of *QST*.

Perhaps the greatest interest in this year's meeting attaches to the Board's consideration of amateur 'phone. It is on this subject, too, that we were particularly impressed by the amount of advance surveying and analyzing that had been done by the directors. Each one knew beyond peradventure how his division stood on the perennial problem of dividing frequencies between 'phone and c.w. And it should here be mentioned that at the meeting practically every director stated that his decisions were being made on a statistical basis and that on each angle of this problem he was voting strictly in accordance with the instructions of his member-

ship. The subject got a thorough combing over, band by band. Briefly reported, the only change in 'phone allocations recommended by the Board was to double the ten-meter authorization to read 28-mc. to 29-mc., or half of the band.

'Phone was the first important subject reached by the Board on its agenda and so was considered the first day of the meeting but, as has frequently been the case, it was reexamined the second day. By almost a unanimous vote the Board decided to request no change in the 'phone allocations in the 1715-2000 band and later in its meeting declined to reopen that item for reconsideration. By a vote of 8 to 5 it rejected a proposal to widen the 75-meter allocation by 50 kilocycles. With only one dissenting voice it voted against any 'phone allocation in the 7-mc. band. 'Phone in the 14-mc. band came in for the most attention and in the course of the meeting five separate motions looking to the widening of this allocation were offered but all to meet defeat, three of them by being voted down and two for want of a second. The question of moving the 'phone allocation to one end or the other of the band was also the subject of three motions. The Canadian regulations are written for another year and have the 'phone allocation in the center of the band. For this reason the only action taken by the A.R.R.L. Board was to request the F.C.C. to move our allocation to the high-frequency end of the band if and when Canada does the same thing. On these 'phone matters neither the President nor the Canadian General Manager voted, that the questions might be settled strictly in accordance with the wishes of the United States divisions.

There is no specific F.C.C. rule against 'phone overmodulation, which everyone knows to be the curse of modern 'phone operating. The Board asked the F.C.C. to adopt a regulation prohibiting modulation in excess of 100% and requiring 'phone stations to possess some means of determining when the modulation exceeds that value. They also voted to ask the Commission to forbid the transmitting of music by amateur 'phones, a testing privilege which has been widely abused, particularly in the cultivation of SWL audiences.

The Board feels that it is really time to recognize the 28-mc. band as a communicating band. Desiring also to have the mobile privilege extended to this band they first asked the Commission to extend to it the same requirement for d.c. plate supply and stable signals as apply to the lower frequencies, to open up the low-frequency



half of it to 'phone, and then to make it all available for portable-mobile operation under the same regulations as apply to the ultra-highs.

Probably the most important subject dealt with by the Board was plans for widening the amateur frequency allocations at the Cairo conference. Pursuant to a recommendation of the General Counsel and Secretary, the Board appointed a continuing Cairo Committee of three directors, under the chairmanship of Dr. Woodruff of the Atlantic Division, and clothed it with complete planning authority and gave it a substantial appropriation to finance its work. Its work embraces the planning of an educational campaign, plans for coöperation with amateurs in other countries, and a study of the need for specific legislation in this country and of all ways and means of securing extension of amateur privileges by international agreement. It will be clearly evident from a reading of this minute that the Board means business.

Starting the first of next year we have a new A.R.R.L. division—the Southwestern Division, consisting of the Los Angeles and San Diego A.R.R.L. sections of California and the state of Arizona. In the elections of this autumn it will elect its first director, to take office January 1st. The boys down there have long been plugging for their own division because their group is far separated from the other populous center of the division in the San Francisco region, and now they have it. Greetings, Southwestern Division!

The drills of the Army and Navy nets were regarded by the Board as causing an unwarrantable amount of interference with other amateur activity. It is hoped that arrangements may soon be made with these services whereby the bulk of the activity of the stations associated with their nets may be transferred to government frequencies.

A Board committee under the chairmanship of Director Bailey was charged with the duty of making a complete investigation of the executive organization of the League, its accounting system, and the League constitution and by-laws, and directed to report its recommendations to the Board as early as possible. To this committee was also referred a study of the question of eligibility to the A.R.R.L. directorate.

The Board decided that to be eligible to affiliation, or the continuing of affiliation, a majority of the licensed amateur members of a club must also be members of the League. A rule was adopted requiring the approval of the division director as the first step in plans for holding division conventions. QSL Bureaus were ordered established for the KA, K4, K6 and K7 members. The by-laws concerning Canada were amended to provide for an alternate C.G.M. and for voting by licensed amateurs, the same as in U. S. elections, a job that was overlooked last year. The first year's experimental program with small adminis-

trative appropriations for directors having proved satisfactory, the Board continued the practice with a small increase in the appropriation. The hearty thanks of the Board were expressed to the QSL Managers and to the owners and personnel of the Standard Frequency Stations.

Quite interesting was the Board's action in requesting the F.C.C. to specify that the three QSO's necessary for the renewal of amateur licenses must be by means of c.w. radiotelegraphy, not by 'phone. The Board feels that too many 'phone operators are forgetting the code and that 'phone must be regarded as an auxiliary to the basic form of amateur radio, which is telegraphy. With thought to the improvement of practical operating conditions the Board recommends to A.R.R.L. members that they employ dummy antennas for all transmitter testing not requiring communication at a distance; that they equip themselves with arrangements to reduce power to the minimum necessary when working over short distances; and that they make use of such devices as band-switching transmitters to make it easy to make use of the logical frequency band for each communicating need. *QST* will publish more information on these subjects soon.

These, of course, are only the high-lights of a two-day meeting. Some of the plans started at this meeting will take form only in the months to come, and *QST* will carry further information as developments occur. We give you now the minutes of the meeting. Chiefly they are a record only of motions, actions, orders and cannot hope either to portray the spirit and color of that meeting or to cover the multitude of smaller subjects that were discussed informally. For details of any item in which you are particularly interested, ask your director.

## Minutes of 1935 Annual Meeting of Board of Directors, American Radio Relay League, May 10 & 11, 1935

In compliance with the constitution and responsive to due notice, the Board of Directors of the American Radio Relay League, Inc., convened in regular annual meeting at The Hartford Club, Hartford, Conn., on May 10, 1935. The meeting was called to order by President Maxim at 10:03 a.m., d.s.t. After a brief address by the President, the roll was called, with the following directors present:

Hiram Percy Maxim, President, Chairman  
Alex Reid, Canadian General Manager  
Bennett R. Adams, Jr., Southeastern Division  
Russell J. Andrews, Rocky Mountain Division  
G. W. Bailey, New England Division  
H. L. Caveness, Roanoke Division  
S. G. Culver, Pacific Division  
Ralph J. Gibbons, Northwestern Division  
Wayland M. Groves, West Gulf Division  
Kenneth T. Hill, Hudson Division  
M. M. Hill, Delta Division  
Carl L. Jabs, Dakota Division  
H. W. Kerr, Midwest Division  
Edward A. Roberts, Central Division  
Eugene C. Woodruff, Atlantic Division

Absent: Charles H. Stewart, Vice-President, ill. There were also present Secretary K. B. Warner, Treasurer A. A. Hebert, Communications Manager F. E. Handy, General Counsel Paul M. Segal and Assistant Secretary A. L. Budlong. The Chairman informed the Board that the Vice-President was ill and expressed regret at his inability to be present.

After discussion of the minutes of the previous meeting, on motion of Mr. Reid, seconded by Mr. M. M. Hill, VOTED that the same are approved in the form in which they were issued by the Secretary. Messrs. Groves and K. T. Hill requested to be recorded as not voting because they had not been present at the previous meeting.

On motion of Mr. Culver, seconded by Mr. Kerr, unanimously VOTED to accept the annual reports of the officers and the General Counsel to the Board of Directors and place the same on file.

Mr. Gibbons pointed out an omission from the minutes of the Executive Committee meeting of July 12, 1934. After discussion, ORDERED by the Chairman that the minutes of the Executive Committee meeting of July 12, 1934, be corrected by incorporating in the fourth paragraph from the end thereof the sentence "In this connection the Committee examined the request of Director Gibbons concerning headquarters representation at the Northwestern Division convention" and that corrected minutes be issued to all directors who were serving at that time. On motion of Mr. Bailey, seconded by Mr. Roberts, unanimously VOTED that all acts performed and all things done by the Executive Committee since the last meeting of the Board, and by it reported to the Board, are ratified and confirmed by the Board as the actions of the Board.

On motion of Mr. Reid, seconded by Mr. Jabs, unanimously VOTED that the Board, having considered its mail vote with reference to rescinding the instructions given the editor of *QST* concerning advocating band-pass filters or similar apparatus for amateur 'phone, and having examined the same, now ratifies the vote taken and decides to take this action as of the date of receipt of the ninth vote of 'aye' by mail, Oct. 20, 1934.

On motion of Mr. Woodruff, seconded by Mr. Culver, unanimously VOTED that the Board, having considered its mail vote with reference to rescinding the resolutions concerning the affiliating of clubs and in scheduling the subject for reconsideration at the 1935 annual meeting, and having examined the same, now ratifies the vote taken and decides to take this action as of the date of receipt of the ninth vote of 'aye' by mail, Jan. 24, 1935.

Mr. Reid presented his report as Canadian General Manager. In turn, every division director rendered a report on conditions in his division.

On motion of Mr. Bailey, with numerous seconds, unanimously VOTED that the Secretary is instructed to send immediately to Vice-President Stewart a telegram of greetings and good wishes from all the members of the Board.

At the suggestion of Mr. Culver, the Chairman ORDERED that Technical Editor James J. Lamb report at the meeting as adviser to the Board on technical questions.

On motion of Mr. Roberts, the Board recessed for luncheon at 1:09 p.m., reconvening at 2:21 p.m. with all directors and officials in attendance except Director Jabs.

On motion of Mr. Andrews, seconded by Mr. Kerr, unanimously VOTED that the sum of twenty-eight hundred dollars (\$2800) is hereby appropriated from the surplus of the League, as of this date, for the purpose of defraying the expenses of holding this meeting of the Board of Directors, any unexpended remainder of this sum to be restored to surplus.

On motion of Mr. Culver, seconded by Mr. Gibbons, unanimously VOTED to grant affiliation to the following societies:

Inter-City Radio Club.....Galion, Ohio  
Central Massachusetts Radio Association  
Worcester, Mass.  
Rockomoka Amateur Radio Club...Livermore Falls, Me.  
The New England Division Radiophone Association  
Auburndale, Mass.  
Alle-Kiski Radio Club.....Tarentum, Pa.  
Miller Amateur Radio Club.....Miller, So. Dak.

Faribault Amateur Radio Club.....Faribault, Minn.  
Mountaineer Amateur Radio Association  
Fairmount, W. Va.  
Sedalia Amateur Radio Club.....Sedalia, Mo.  
Akron Progressive Short Wave Radio Association

Akron, Ohio  
Lynchburg Short Wave Club.....Lynchburg, Va.  
Albany Amateur Radio Association.....Albany, N. Y.  
North Texas Agricultural College Radio Club

Arlington, Texas  
Amateur Radio Experimenters Club.....Macomb, Ill.  
The Henlopen Amateur Radio Club....Lewes, Delaware  
Fort Peck Radio Club.....Ft. Peck, Montana  
Butte Radio Operators Association.....Butte, Montana  
The South Plains Radio Club.....Lubbock, Texas  
Tampa Amateur Radio Club, Inc.....Tampa, Florida  
Parkway Radio Association.....Roslindale, Mass.

Technical Editor Lamb here reported to the meeting at 2:30 p.m.

On the question of reexamining League policy with respect to the affiliating of clubs, after extended discussion, on motion of Mr. Roberts, seconded by Mr. Jabs, the following resolution was unanimously ADOPTED:

Resolved: that it is the policy of the League not to grant affiliation to any amateur society unless 51% of the licensed amateurs belonging to the applicant society are also members of the League; that the Communications Manager is hereby directed to make a suitable survey of the affiliated clubs at the end of each year; and that it is hereby declared to be the policy of the League to terminate the affiliation of any society found by such survey not to comply with this condition.

Mr. Jabs entered the meeting at the beginning of the foregoing discussion, at 2:38 p.m., and participated in the same.

On the question of requests to the Federal Communications Commission to amend the amateur regulations concerning the bands of frequencies open to 'phone operation: 1715-2000 kc. On motion of Mr. M. M. Hill, VOTED to request no change in the 'phone allocations in the 1715-2000 kc. band. Mr. Adams asked to be recorded as opposed.

3500-4000 kc. Moved, by Mr. Jabs, and seconded by Mr. Groves, that the Board instruct the Secretary to request the F.C.C. to expand the 3900-4000 kc. Class-A 'phone assignment to read 3850-4000 kc. Mr. Jabs requested a record vote. The yeas and nays being ordered, the said question was decided in the negative: yeas, 5; nays, 8. Those who voted in the affirmative are Messrs. Adams, Caveness, Gibbons, Groves and Jabs; those who voted opposed are Messrs. Andrews, Bailey, Culver, K. T. Hill, M. M. Hill, Kerr, Roberts and Woodruff; not voting, Messrs. Maxim and Reid. So the motion was rejected.

7000-7300 kc. On motion of Mr. Bailey, seconded by Mr. Jabs, VOTED, with one dissenting voice, to request no change in the 7000-7300 kc. band.

14,000-14,400 kc. Moved, by Mr. M. M. Hill, seconded by Mr. K. T. Hill, that the F.C.C. be requested to move the 14-mc. 'phone authorization to the high-frequency end of that band. The yeas and nays being ordered, the said question was decided in the negative: yeas, 6; nays, 7. Those who voted in the affirmative are Messrs. Adams, Caveness, Groves, K. T. Hill, M. M. Hill and Woodruff; those who voted opposed are Messrs. Andrews, Bailey, Culver, Gibbons, Jabs, Kerr and Roberts; not voting, Messrs. Maxim and Reid. So the motion was rejected.

On motion of Mr. Culver, seconded by Mr. Jabs, VOTED that the Federal Communications Commission is requested to move the 14-mc. 'phone allocation to the high-frequency end of that band when and if the Canadian government does the same thing with respect to the Canadian amateur authorization. Messrs. Gibbons and Kerr asked to be recorded as voting opposed.

Moved, by Mr. M. M. Hill, that the F.C.C. be requested to widen the 14-mc. 'phone authorization to read 14,200 to 14,400 kc. when and if Canada moves the Canadian amateur authorization to the high-frequency end of the band. But there was no second, so the motion was lost.

Moved, by Mr. Groves, and seconded by Mr. Gibbons, that the F.C.C. be requested to expand the 14-mc. 'phone allocation to read 14,100 to 14,300 kc. The yeas and nays being ordered, the said question was decided in the negative: yeas, 5; nays 8. Those who voted in the affirmative are Messrs. Adams, Gibbons, Groves, Jabs and Kerr; those who voted opposed are Messrs. Andrews, Bailey, Caveness, Culver, K. T. Hill, M. M. Hill, Roberts and Woodruff; not voting, Messrs. Maxim and Reid. So the motion was rejected.

Moved, by Mr. Adams, and seconded by Mr. Jabs, that the F.C.C. be requested to expand the 14-mc. 'phone authorization to read 14,150 to 14,300 kc. The yeas and nays being ordered, the said question was decided in the negative: yeas, 6; nays, 7. Those who voted in the affirmative are Messrs. Adams, Gibbons, Groves, M. M. Hill, Jabs and Kerr; those who voted opposed are Messrs. Andrews, Bailey, Caveness, Culver, K. T. Hill, Roberts and Woodruff; not voting, Messrs. Maxim and Reid. So the motion was rejected.

(See further discussion of this question later in these minutes.)

**28,000-30,000 kc.** On motion of Mr. Gibbons, seconded by Mr. Jabs, unanimously VOTED that the F.C.C. is requested to widen the 28-mc. 'phone authorization to read 28,000 kc. to 29,000 kc.

After discussion of additional authorization for portable-mobile operation, on motion of Mr. Jabs, seconded by Mr. Groves, unanimously VOTED that the Federal Communications Commission is requested to extend the requirement of d.c. plate supply on the lower amateur frequencies to apply to the ten-meter band by amending the stipulated figure in Rule 382 to read 30,000 kilocycles and at the same time is requested to extend the portable-mobile privilege to apply to the ten-meter band by amending the stipulated figure in Rules 368 and 387 to read 28,000 kilocycles.

**1715-2000 kc.** Moved, by Mr. Adams, that the Board reconsider its action with respect to the 1715-2000 kc. band. But the motion was ruled out of order by the Chairman because Mr. Adams had not voted in the affirmative on the question. As a courtesy to Mr. Adams, moved, by Mr. Culver, and seconded by Mr. Adams, that the Board reconsider its decision on this question. But the motion was rejected.

On the question of curbing overmodulation by 'phone stations, after discussion, on motion of Mr. Gibbons, seconded by Mr. Roberts, unanimously VOTED that the Federal Communications Commission is requested to adopt the following text in lieu of its present Rule 381:

The emissions of amateur transmitters operating on frequencies below 30,000 kc. shall be free from spurious radiations of sufficient strength to cause interference, to receivers of modern design, outside the communication band normal for the type of transmission employed. Amateur radiotelephone stations in no case shall use amplitude modulation in excess of 100 percent of the amplitude of the emitted carrier and shall employ means to insure that the amplitude modulation is not in excess of 100 percent.

Moved, by Mr. Roberts, that the Communications Manager be directed to appoint additional official observers to be known as Official 'Phone Observers whose duty would be to monitor 'phone stations, check violations, serve notices on violators, report non-compliance to the Communications Manager; that the Communications Manager be directed, if offenders persist after due notice from headquarters, to penalize them by recommendations to the F.C.C. that they be suspended from the use of 'phone privileges for a period of six months to a year. But there was no second, so the motion was lost.

After discussion of the abuse of the "music testing" rule, on motion of Mr. Gibbons, seconded by Mr. Groves, VOTED that the Federal Communications Commission is requested to repeal its Rule 372.

On the question of amending the by-laws to provide uniformity between the Canadian section and the United States divisions with respect to the election of director and alternate, after discussion, moved, by Mr. Reid, and seconded by Mr. Andrews, that a new by-law, to be known

temporarily as By-Law 24a, be adopted and that By-Laws 25 and 28 be amended, so that they read as follows:

24a. An Alternate Canadian General Manager shall be elected at the same time as the Canadian General Manager is elected. Such election shall be subject to all the terms and requirements of these by-laws with regard to directors, both as to the qualifications of candidates and the methods of voting. No person may simultaneously be a candidate for the office of both Canadian General Manager and Alternate Canadian General Manager.

25. The Executive Committee shall delete the name of any nominee who may be ineligible to election and the name of any who may withdraw by written communication. The remaining names shall be listed on a ballot in the order of the number of nominations received. If there be but one eligible nominee, the Executive Committee shall declare him elected without balloting by the membership. If there be more than one eligible nominee, then during the first week of November the Secretary shall send by mail to every member of the League in Canada, a ballot and a return envelope, soliciting a vote for one name. The ballot shall contain a copy of By-Laws 24, 24a, 25, 26 and 27. The Executive Committee shall constitute itself a Committee of Tellers; but any Canadian member of the League who shall deliver to the Secretary on or before the first day of November of election year a written petition signed by at least ten Canadian members of the League stating their desire that he witness the counting by the Committee of Tellers of the Canadian ballots, shall be permitted to do so and shall be accorded every reasonable opportunity to satisfy himself of the correctness of the count reported by the Committee; provided that the aforesaid signatures shall not have appeared on another similar petition. Ballots, to be counted, shall reach the Secretary not later than noon of the twentieth day of December of election year. No ballot shall be counted unless it shall affirmatively appear either from such ballot or the envelope in which it is contained that the member submitting it either is at the time the holder of an amateur radio station or operator's license or has been continuously since May 15, 1934, a Canadian member of the League. The Committee of Tellers shall meet at the headquarters office of the League as soon thereafter as possible, and in the presence of each other shall count the vote, after first eliminating the ballot of anyone disqualified from voting. They shall forthwith prepare and sign a report of the results of the vote, declaring the eligible person receiving the greatest number of votes elected as the new Canadian General Manager; and they shall turn over all their records and ballots to the Secretary for presentation at the next annual meeting of the Board of Directors.

28. The Canadian General Manager shall have the authority to appoint committees and assistants to aid him in the discharge of his duties. All such appointees shall be Canadian members of the League. In case of inability of the Canadian General Manager to attend a meeting of the Board of Directors, he shall so notify the Secretary and, with the giving of such notice, the Alternate Canadian General Manager shall assume all the powers and duties of Canadian General Manager and shall attend such meeting with full powers of that office.

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 14;

necessary for adoption, 11; yeas, 14; nays, 0. Every director voted in the affirmative except Mr. Culver, who was momentarily absent from the meeting. So the by-laws were amended as proposed.

Moved, by Mr. Jahs and seconded by Mr. Culver, that By-Law 16 (17) be amended to provide that certified public accountants be engaged to serve as the Committee of Tellers in director elections. After discussion, the yeas and nays being ordered, the said question was decided in the negative: whole number of votes cast, 13; necessary for adoption, 11; yeas, 4; nays, 9. Those who voted in the affirmative are Messrs. Adams, Culver, Groves and Jahs; those voting opposed are Messrs. Andrews, Bailey, Caveness, K. T. Hill, M. M. Hill, Kerr, Reid, Roberts and Woodruff; not voting, Messrs. Maxim and Gibbons. So the motion was rejected.

On the question of better organization within the divisions, after extended discussion, on motion of Mr. Caveness, seconded by Mr. Culver, unanimously VOTED that there is hereby allocated to each division director of the League and to the Canadian General Manager the sum of two hundred dollars (\$200) for legitimate A.R.R.L. expenses in his area; and that there is hereby appropriated from the surplus of the League, as of this date, the sum of twenty-eight hundred dollars (\$2800) for the purpose of defraying this expense, any unexpended remainder of this fund on the date of the next annual Board meeting to be restored to surplus.

On motion of Mr. Culver, seconded by Mr. Andrews, the Board RATIFIED the action of the Secretary in disbursing to Director Gihbons fifteen dollars eighty-four cents (\$15.84) and to Director Andrews ten dollars forty-five cents (\$10.45) for legitimate expenses in excess of their authorized appropriations for last year.

On motion of Mr. R. Roberts, VOTED that the Board will hold an evening session. Whereupon the Board recessed for dinner at 6:49 p.m., reconvening at 8:35 p.m. with all directors and officials in attendance.

On the question of the feasibility of circulating the annual reports of directors amongst the directors in advance of the annual meeting, moved, by Mr. Culver, and seconded by Mr. K. T. Hill, that the director reports be circulated thirty days in advance of the annual meeting. But the motion was rejected.

The Chairman outlined the need for further examination of plans for the Cairo conference and called upon Mr. Segal to report on this subject for the General Counsel and Secretary. Mr. Segal reported that the General Counsel and Secretary believed that the League probably could secure the adoption by the Congress of appropriate orders to the delegation to Cairo, instructing them to demand or to insist upon a widening of amateur hands, but that, because the problem was an international one, they had as yet been unable to formulate a program which they definitely believed would insure the widening of amateur frequency allocations at the Cairo conference; and that they proposed that the Board appoint a continuing committee to formulate the A.R.R.L. program for that purpose. After discussion, on motion of Mr. Gihbons, the Board adjourned at 9:56 p.m. under order to reconvene at 9:00 a.m., d.s.t., the following day. The Board reassembled at the same place the following morning and was called to order at 9:16 a.m., d.s.t., with all directors present except Vice-President Stewart and with Secretary Warner, Communications Manager Handy, General Counsel Segal, Assistant Secretary Budlong and Technical Editor Lamb also in attendance; Treasurer Hebert entered the meeting at 9:39 a.m. The Board having unanimously come to the opinion that an extension of amateur facilities by international agreement is immediately necessary:

Upon consideration of the item of the agenda relating to the question of preparation of the A.R.R.L. position with regard to the forthcoming administrative conference at Cairo, and

Upon consideration of the report of the General Counsel and of the Secretary regarding this,

On motion of Mr. Culver, it was unanimously VOTED:

- 1) That it is the view of the Board that an educational campaign with the Congress and with the executive arm of the Federal Government concerning amateur radio is now highly desirable.

2) That a committee consisting of Messrs. Woodruff, Bailey and Roberts is authorized to study the entire Cairo question and shall be known as the Cairo Committee.

3) The Cairo Committee shall forthwith commence a study of the objectives outlined in paragraph (1) and of all related questions concerning plans of the A.R.R.L. for the Cairo conference, including specifically co-operation with amateurs in other countries, the need for specific legislation, and all ways and means of securing extension of amateur privileges by international agreement.

4) The Cairo Committee shall meet upon the call of its chairman or upon the joint call of its other two members at times and places provided for in the call.

5) From time to time the Cairo Committee shall make such reports and recommendations to the Board as are appropriate.

6) The President of the League is hereby instructed that pursuant to the provisions of Article IV, Section 9, of the constitution, he shall call special meetings of the Board of Directors at such times and at such places as the Cairo Committee shall in its discretion request.

7) The Cairo Committee shall have full power, through the General Manager, to call upon the headquarters office of the A.R.R.L. for such information, executive, technical and clerical assistance as it may require.

8) The Cairo Committee shall consider and at the earliest convenient time report to the Board concerning the advisability of employing such additional executive, legal, engineering and public-relations personnel as may be desirable to accomplish the purposes of the Board as now expressed.

9) There is hereby appropriated as of this date for the use of the Cairo Committee the sum of two thousand dollars (\$2000) for its necessary expenses; any balance unused to be returned to the surplus of the League.

On motion of Mr. Kerr, seconded by Mr. Andrews, unanimously VOTED that a committee consisting of Directors Bailey, Roberts and K. T. Hill is appointed to make, at the earliest practicable moment, a complete investigation of the executive organization of the League, its system of accounting, the League constitution and by-laws; and report its conclusions and recommendations by mail to the members of the Board; and that the sum of five hundred dollars (\$500) is hereby appropriated this date from the surplus of the League for such investigation, any unused portion thereof to be returned to surplus.

On the more effective employment of amateur frequencies, after discussion, on motion of Mr. Jahs, seconded by Mr. Culver, unanimously VOTED that the Board goes on record as recommending:

- 1) That dummy antennas be used for testing not involving actual communication.
- 2) That amateurs reduce power for local work in accordance with Sec. 324, Communications Act of 1934.
- 3) That more diversified use of bands be encouraged by means of band-switching and similar devices.

and that the editor of *QST* is instructed to print therein information on reducing power for local work.

The Secretary's request for authorization to publish the position statement of the League annually, on motion of Mr. Bailey, seconded by Mr. Jahs, was laid on the table by unanimous vote.

On the question of the desirability of making the reports of the officers available to the membership, after discussion, on motion of Mr. Gihbons, seconded by Mr. Kerr, VOTED that the officers' reports shall be available to members im-

mediately after the 1936 annual meeting and similarly each year thereafter, at the cost price to the League.

The Board recessed for luncheon at 1:10 p.m. reconvening at 2:35 p.m. with all directors present except the Vice-President and all officials in attendance except the General Counsel.

On motion of Mr. Hill, seconded by Mr. Bailey, unanimously VOTED that the annual reports of the officers of the League shall be copyrighted.

On the question of interpreting Paragraph 2 of Article IV, constitution, regarding eligibility to the Board of Directors, on motion of Mr. Culver, seconded by Mr. Andrews, unanimously VOTED that this question is referred to the investigating committee which is to review the constitution.

On motion of Mr. Kerr, seconded by Mr. Caveness, unanimously VOTED that the hearty thanks and appreciation of the Board of Directors are extended to the owners and personnel of the A.R.R.L. Standard Frequency Stations.

Mr. Culver asked renewed consideration of the question of "family membership" and, seconded by Mr. Reid, moved that the by-laws be amended by adding after By-Law 3 a new paragraph to be known temporarily as By-Law 3a, as follows:

3a. Provided that the member is the husband or wife, brother or sister, son or daughter, father or mother of another member living at the same address paying dues at the rate of \$2.50 per year, he may at his request pay dues of \$0.50 per year, in advance, but without the right to receive QST; said membership to be concurrent with that of the member receiving QST.

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 14; necessary for adoption, 11; yeas 14; nays, 0. Chairman Maxim did not vote; every other director present voted in the affirmative. So the by-laws were amended as proposed.

On motion of Mr. Gibbons, seconded by Mr. Adams, unanimously VOTED that the Communications Manager is requested to change A.R.R.L. practice in message checking from the cable count to the land count.

On the question of the added interference and congestion in amateur bands caused by the drills of amateurs associated with Army and Navy networks, after discussion, on motion of Mr. Reid, seconded by Mr. Gibbons, unanimously VOTED that the Army and Navy are requested to remove their drill operations from the amateur bands.

The Secretary read communications received from San Diego (California) Radio Amateurs' Association, Eastern Branch Amateur Radio Telegraphers League, and Louis R. Huber.

Moved, by Mr. M. M. Hill, and seconded by Mr. Gibbons, that the Board reconsider its decision concerning the 14-mc. 'phone allocation. The yeas and nays being ordered, the said question was decided in the affirmative: yeas, 8; nays, 7. Those who voted in the affirmative are Messrs. Adams, Caveness, Gibbons, Groves, M. M. Hill, Jabs, Maxim and Woodruff; those who voted opposed are Messrs. Andrews, Bailey, Culver, K. T. Hill, Kerr, Reid and Roberts. Chairman Maxim originally did not vote but, the result being a tie, then cast his vote in the affirmative. So the motion to reconsider was adopted. Upon reconsideration:

Moved, by Mr. Gibbons, and seconded by Mr. Groves, that the Federal Communications Commission be requested to open 14,100 to 14,300 kc. to Class-A 'phone operation. But after discussion the said motion was rejected. Moved, by Mr. M. M. Hill, that the Federal Communications Commission be requested to move 14-mc. 'phone to the low-frequency end of that band and increase the 'phone allocation to read 14,000 to 14,150 kc. But there was no second, so the motion was lost.

Moved, by Mr. Woodruff, that it be adopted as a working rule of the Board that any additions by directors to the agenda for annual meetings be added by the end of the first day of such meeting. But there was no second, so the motion was lost.

On motion of Mr. Woodruff, seconded by Mr. Roberts, after discussion, unanimously VOTED to adopt the follow-

ing as a regulation concerning the approval of division conventions:

In order to bring about uniformity in the method of handling A.R.R.L. division conventions in the future, it is suggested that when affiliated clubs or associations desire to sponsor such a convention, the question of approval be first submitted to the director of the division. This action should be taken as far in advance as possible, but not less than six months prior to the proposed date of the convention.

Such application for approval shall give the director as much information as possible to enable him to consider the application intelligently, and particularly shall give the following information:

- (1) The date or dates upon which it is desired to hold the convention.
- (2) The place at which it is proposed to be held.
- (3) The clubs or associations who propose to sponsor it.
- (4) The names and addresses of the officers chosen to conduct the convention.

When the director is satisfied that the approval of such a convention will be for the best interests of all concerned he will forward the application to the A.R.R.L. headquarters at West Hartford for the formal approval of the Executive Committee. Upon such final approval the chairman or secretary of the convention committee will be notified by the headquarters office.

On motion of Mr. Woodruff, seconded by Mr. Groves, VOTED that the Federal Communications Commission is requested to amend its Rule 402 to provide that the stipulated three contacts with other amateurs constituting the proof of use necessary for the renewal of an amateur license must be by means of c.w. radiotelegraphy.

Moved, by Mr. Groves, and seconded by Mr. Adams, that alternate directors be permitted to sit at all Board meetings as non-participating observers at their own expense. But after discussion, the said motion was rejected.

At the request of Mr. Culver the Chairman directed the Secretary to respond to the letter of the San Diego Radio Amateurs' Association expressing regret at the inability of the Board to attend their radio amateur fiesta in July but transmitting the Board's good wishes. Moved, by Mr. Culver, and seconded by Mr. Caveness, that a headquarters representative be sent to the San Diego fiesta. After discussion the motion was rejected.

Moved, by Mr. Culver, that a new A.R.R.L. division be created, to be known as the Southwestern Division, said division to consist of the Los Angeles, San Diego and Arizona sections of the Pacific Division as at present designated; that it be the order of the Board that a director be elected to serve for the term January 1, 1936, to December 31, 1936, and that subsequent to December 31, 1936, the term be for two years; that to this end By-Laws 4(a) and 18 are amended as follows:

In paragraph (a) of By-Law 4, change the stipulation of the Pacific Division to read "PACIFIC DIVISION, that portion of the state of California not included in the Southwestern Division, and the state of Nevada, the territory of Hawaii and the Philippine Islands." Add the following: "SOUTHWESTERN DIVISION, the counties of Imperial, Inyo, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara and Ventura of the state of California, and the state of Arizona."

In the first sentence of By-Law 18 add the word "Southwestern" to the list of divisions holding elections in each even-numbered year.

The yeas and nays being ordered, the said question was decided in the affirmative: whole number of votes cast, 15; necessary for adoption, 11; yeas, 14; nays, 1. Those who voted in the affirmative are Messrs. Adams, Andrews, Bailey, Caveness, Culver, Gihbons, Groves, K. T. Hill, M. M. Hill, Jabs, Kerr, Maxim, Reid and Roberts. Mr. Woodruff voted opposed. So the by-laws were amended as proposed and a special election ordered to choose a Southwestern Division director for the year 1938.

Moved, by Mr. Culver, that WAC certificates be issued to all those who qualify for them, regardless of their affiliation or membership in any amateur organization, said certificate to be issued to members of the American Radio Relay League free of charge, and at a cost of fifty cents (\$0.50) to all non-members of the American Radio Relay League. But after discussion, with the permission of his second, Mr. Culver withdrew the motion. On further motion of Mr. Culver, seconded by Mr. Gihbons, VOTED that A.R.R.L. recommends to the International Amateur Radio Union that WAC certificates be issued to all those who qualify for them, regardless of their affiliation or membership in any amateur organization, said certificate to be issued to members of a member-society free of charge, and at cost to all non-members.

Moved, by Mr. Culver, and seconded by Mr. Jabs, that this organization require that an application be filed by all applicants for membership in the organization, said application to show whether applicant is a holder of an amateur license, either station or operator, issued by the United States, the date of expiration of such license, and the call letters assigned to such station; and further that the membership files of this organization be kept in such a manner that the number of members holding such licenses can be readily determined. But after discussion, the motion was rejected.

On motion of Mr. Culver, seconded by Mr. Gihbons, VOTED that additional QSL Bureaus shall be established to the end that there shall be one in every district in the U. S. and Canada and one for every A.R.R.L. section having its own international prefix regardless of whether included in one of the U. S. or Canadian divisions.

On motion of Mr. Culver, unanimously VOTED that the hearty thanks and appreciation of the Board of Directors are extended to the QSL Managers of the League.

Moved, by Mr. Culver, that each QSL Manager be furnished a copy of each successive edition of the Radio Amateur Call Book Magazine. But there was no second, so the motion was lost.

Moved, by Mr. Culver, that the sum of fifty dollars (\$50) be appropriated from surplus to cover the expenses involved in the mailing of traffic to China from the Philippine Islands, said fund to be administered by the S.C.M. of the Philippine Island section. But there was no second, so the motion was lost.

On motion of Mr. Gihbons, seconded by Mr. Culver, VOTED that the investigating committee previously appointed is requested to examine the desirability of making the technical editor of *QST* an officer of the League.

Moved, by Mr. Jabs, that the A.R.R.L. sponsor a campaign for new licensed-amateur members through *QST* and by enlisting the aid of the affiliated clubs and members. But there was no second, so the motion was lost.

On motion of Mr. Caveness, the Board adjourned, sine die, at 6:34 p.m. Total time of sessions, 16 hours, 48 minutes.



Secretary

teur station license to an applicant who has recently qualified for license as an amateur operator." Under the old rules many station licenses were issued without the holder being an amateur operator. As these station licenses now expire, some of the holders are qualifying as amateur operators and desire station renewal but are unable to satisfy Rule 402 because the applicant, lacking an operator license, has not operated his own station. Rule 402 was not intended to bar or delay such applications and for that reason the Commission has made the modification.

**"Losses"** We have met a few amateurs recently who were of the impression that, through a whole series of national and international radio conferences, the amateur has lost more and more of his frequencies, until to-day he possesses but a remnant of his former holdings. As a matter of fact there have been but two international conferences which dealt with amateur radio, one at Washington in 1927 which did change our bands, and one at Madrid in 1932 which made no changes. Commentators on this subject forget that both before and at the time that amateurs opened up the high frequencies, our only assignment in this country was the band 1500-2000 kc. The early amateur investigators of the higher frequencies operated under experimental licenses and the early transatlantic work was done either under such licenses or by virtue of special temporary permission, since amateur licenses granted no right to transmit below 150 meters. When we had uncovered the usefulness of the higher frequencies the League went to work to get assignments for amateurs and secured substantial allocations at 3500, 7000 and 14,000 kc. A.R.R.L. successfully defended these assignments through a whole series of national radio conferences which, during the period of several years when the radio law in this country had broken down, constituted the *de facto* radio administration. We were still enjoying their use at the time of the Washington conference and the United States government was willing that we continue in their possession; it made formal proposals to the conference to that end and valiantly supported that point of view. But unfortunately these allocations were purely a U. S. assignment and had no international standing, since this was the first international conference to consider amateur allocations and the first one to deal with the high-frequency part of the spectrum. Despite the efforts of the U. S., foreign governments would not agree to allocations of that magnitude for amateurs, and our 7-mc. and 14-mc. bands were reduced. They remain in precisely those figures to-day, the Madrid conference having made no changes in them. There has been no "series of losses", and the international amateur allocations have never had any other figures than those of to-day.

**License Note** The F.C.C. has made the following addition to our Rule 402, providing for proof of use before renewals: "This rule shall not prevent renewal of an ama-



## Cairo Note

Any casual examination of the "wide open spaces" on either side of our crowded high-frequency bands gives any listening amateur the impression that adequate use is not being made of the fixed-service assignments and that there is room to spare, which we might well enjoy. There is room to spare if modern engineering considerations can govern the allocation question but the actual set-up constitutes a formidable obstacle to such an aspiration. It would be well for amateurs to have a better appreciation of the situation. The biggest difficulty is that inertia and national jealousies make impossible any truly scientific attack by international conferences upon the problem of a better arrangement of assignments in that service whose bands adjoin ours. An administration secures the right, on behalf of one of her nationals, to operate a station in the fixed service on one of these frequencies by means of a procedure known as notification to the international bureau at Berne. The bureau is notified of the frequency on which the station is going to work and the date when it is placed in service. There is involved a delicate international subject and it has never been thoroughly thrashed out but in general the system operates on a priority basis—first come, first served. The first station to notify its intention to use a certain frequency is regarded as entitled to protection against interference from all subsequent comers. There are, of course, many additional notifications upon the same frequency, and in fact some of the channels have a great number of stations "registered" upon them. In principle the second "registrant" is entitled to protection against interference from all subsequent ones, and they may be made to cease operation if they interfere with him, but he in turn may use the frequency only to the extent that does not interfere with those who notified before him. If there were twenty stations registered upon a frequency, the tenth in priority would be entitled to protection from the last ten but would have to respect the prior right of the nine who preceded him. Notifications have been filed on all the channels in the fixed service, many times in the case of some of them. We do not make a fair examination of the situation when we contemplate the large unoccupied regions on our tuners as we listen in at our individual stations, for an apparently unoccupied frequency may be in use in another part of the world and inaudible to us or it may be in use at a different time of day—yet all such use would be prevented by the assignment of such frequencies to amateur radio, which we must admit will effectively ruin a band for any other purpose! Those fixed-service frequencies upon which we hear nothing are "registered" upon and in all probability have active stations upon them somewhere in the world—stations which, by reason of their priority, may not be interfered with by subsequent comers.

Now if we propose to displace a certain group of fixed stations on the ground that there is adequate room for them elsewhere, we immediately encounter not only inertia and reluctance but opposition that has a certain measure of justification behind it for the reason that every such displaced station would come as a late registrant upon his new frequency and would have the right to operate only to such an extent as did not interfere with those who had previously established their services upon that frequency and so notified the Berne Bureau. International jealousies do not permit the rational contemplation of complex working agreement for time-sharing between thousands of station operators in every part of the globe. Yet any plan by us to expand our bands inevitably involves the displacement of scores of stations in the fixed service. Some of them are of no importance or could readily double up under the same administration, but some of them are of high power and very important and have to be given clear berths. But the priority of the little stations of the little nation is just as good internationally, and they can be depended upon to holler their heads off to that effect. So you see, OM's, it isn't going to be all cakes and ale.

## Strays

We still hear of amateurs who, when they want to set up a demonstration amateur radio station at an exhibition or fair or something of that sort, make application for a new license or ask for the special temporary transfer of some existing license to the exhibition location. This is a heritage of the old days, before the provision of last October permitting every amateur to operate a portable. Such a request is now unnecessary and simply invites trouble. All that is necessary is for the amateur who is to assume responsibility for the new station to notify the Radio Inspector that his call will be used as a portable at such-and-such a location between such-and-such dates. One of the purposes of the portable provision is to save the Commission the necessity for issuing these special temporary permits. Amateurs therefore may simply move, notify, and GA—remembering to sign the dizzy portable indication.

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A nickle and a trip to the nearest auto-supply store will bring you a rubber accelerator pad which can be slipped over the knob on the receiver tuning dial to give a better vernier tuning ratio and keep your fingers from being cramped on the small knobs usually attached to dials.

—W6KBY





### 'Phone Monitor—V.T. Voltmeter

A COMBINATION 'phone monitor and vacuum-tube voltmeter using a single tube of the duo-diode-hi- $\mu$  triode type is shown in Fig. 1, the circuit being suggested by Wolcott Smith of the F. W. Sickles Co., Springfield, Mass. The input circuit is arranged so that the diode rectifier portion may be cut in or out of the circuit by means of the switch  $S_1$ ; with the diodes cut in for monitoring, the triode section of the tube is used as an audio amplifier. Switch  $S_2$ , in the plate circuit, cuts in either the headphones, for monitoring, or the 0-1 milliammeter, for voltage measurement.

For voltage measurement the "B" supply should be 100 to 135 volts from a source having good regulation—3% or better—such as batteries or a "B" supply of ample current capacity. Since the maximum current change is small—not over 1 milliamperes—it should not be difficult to maintain sufficiently good voltage regulation with a "B" power pack. To use the tube as a voltmeter the 500-ohm variable cathode resistor,  $R_1$ , should be adjusted so that the plate current is 0.1 ma.

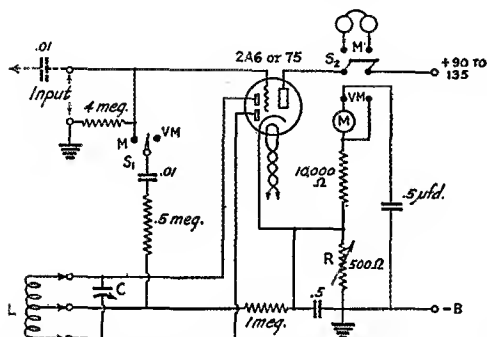


FIG. 1—COMBINED V.T. VOLTMETER AND 'PHONE MONITOR USING DUAL-PURPOSE TUBE

For best results the lead to the triode grid should have low capacity to ground and other parts of the circuit. The milliammeter  $M$  is a 0-1 mil instrument. The 0.01- $\mu$ d. condenser shown dotted at the input terminals is used as an insulating condenser when a.c. measurements are being taken from a source which also has a d.c. potential across it.

with the input terminals shorted. With 90 volts on the plate, the milliammeter will read full scale when a signal of approximately 2.5 volts is applied to the input terminals. With 135 volts on the plate the full-scale reading will be obtained with a signal of approximately 2.0 volts. The voltmeter

may be calibrated in comparison with a known source of voltage.

For monitoring, a pickup coil of suitable inductance is plugged across the tuning condenser  $C$ , the circuit being designed to resonate at the operating frequency. Constants are not critical, a 100- $\mu$ fd. tuning condenser and coils having sufficient inductance to tune to the operating frequency being suggested. A coil consisting of 40 turns of No. 24 d.s.c. or s.c.c. wire on a 1-inch form, tapped at the center, will be suitable for the 3900 to 4000-kc. band with a 100- $\mu$ fd. tuning condenser.

### Time Delay Relay Using a 45 Tube

Usually the radio amateur is not in a position to indulge in apparatus which is not actually necessary, but would be desirable. It has been my good fortune, I believe, to discover a very

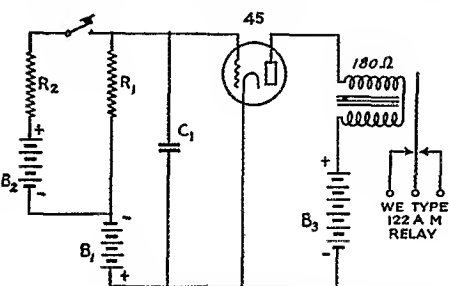


FIG. 2—TIME-DELAY CIRCUIT USING A TYPE 45 TUBE

The time constant in the grid circuit regulates the time of opening and closing of the relay. Circuit constants are discussed in the text.

simple circuit that can be constructed from miscellaneous parts to be found around any amateur's station.

Fig. 3 shows the arrangement of the circuit. Briefly, its operation is as follows. The battery  $B_1$  is of sufficient value to bias the tube so that the plate current is zero, with the key open. The battery  $B_2$  is of the same value as  $B_1$  so that when  $R_2$  is zero the bias on the tube is zero, thereby increasing the current in the plate circuit. The battery  $B_3$  has a voltage of about 90 volts to give a current flow of 40 mils when the resistance of the relay is 180 ohms and the bias zero. The relay used in my experiments was a 122AM Western Electric, which would close with a current of 28 mils and open when the current dropped to 14 mils.

I found the best operation when  $R_1$  was varied in steps of 1 megohm from 1 to 8,  $R_2$  was 500,000 ohms and  $C_1$  varied between .25 and 6  $\mu$ fd.

When  $R_1$  was 5 megohms and  $R_2$  100,000 ohms, it took longer for the relay to open than it did to close using any value of capacity within the limit stated. When  $R_2$  was increased to 500,000 ohms, it took longer to close the relay than it did to open it, of course varying again depending upon the capacity used.

There are a great many variations of the application of this circuit and, of course, other tubes might be used in place of the 45. If one should experiment with this circuit he will find a great many uses to which it can be put in the operation of a transmitter or receiver.

The maximum time delay on closing was  $16\frac{1}{2}$  seconds when  $R_1$  was 5 megohms,  $R_2$  50,000 ohms and  $C_1$  6  $\mu$ fd. The opening time for this same arrangement was  $7\frac{1}{2}$  seconds. The greatest difference obtained in the other direction was 9 seconds to open with  $1\frac{1}{2}$  seconds to close, when  $R_1$  was 5 megohms,  $R_2$  100,000 ohms, and  $C_1$  6  $\mu$ fd. The two times were practically the same, about 8 seconds, when  $R_1$  was 8 megohms,  $R_2$  500,000 ohms and  $C_1$  4  $\mu$ fd.

— William P. West  
Franklin Institute, Phila., Penna.

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### Type 59 Tube as Inverted Amplifier

Readers will recall the description in *QST* some time ago of an "inverted" amplifier circuit in

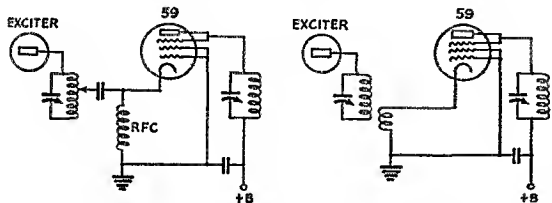


FIG. 3—INVERTED AMPLIFIER CIRCUITS FOR THE 59 TUBE

These circuits require no neutralization for straight-through amplification. The tube connections are those used for Class-B work.

which certain types of triodes or other non-screen-grid tubes can be used as straight amplifiers without neutralization.<sup>1</sup> A letter from R. P. Austin, W3EVA, suggests that the Type 59 tube offers certain advantages for use in this type of circuit since its cathode is indirectly heated, thus avoiding the necessity for filament chokes capable of carrying the comparatively heavy filament current taken by most tubes. We quote below from his letter:

"In connection with inverted r.f. amplifiers I thought I might pass on a bit of data that I don't

<sup>1</sup> Romander, "The Inverted Ultraudion Amplifier," *QST*, September, 1933.

recall having seen incorporated in the original article. No doubt the necessity for somewhat cumbersome r.f. chokes in the filament circuits has prevented wider use of the circuit.

"For a portable transmitter where space and weight are at a premium the 59 tube can be used with very satisfactory results, the tube being connected for Class-B service. The simplicity of an amplifier of this type should prove quite attractive. There is also a great possibility for this type of amplifier for 23 and 56-mc. equipment. Although I haven't tried the idea on these frequencies it has been in use on frequencies as high as 23 mc. commercially.

"For a single-ended inverted 59 amplifier the only equipment required is a suitable tank circuit and blocking capacitor. Aside from this there is nothing else except the incidental hardware. Bias and neutralization are not to be considered, so for the portable job what could be sweeter?

"I haven't tried the idea for doubling but it should do the trick. The only problem is that of correct bias for this service, which should be an easy matter to determine. No bias is necessary where the tube is used on the driver frequency, since the 59 is designed for zero-bias operation when properly connected."

Suggested circuit diagrams are given in Fig. 3. That at the left is for ordinary capacity coupling; that at the right for inductive coupling, using a few turns in the cathode circuit as the coupling coil. Because of the high amplification factor of the tube connected for Class-B service and consequent low grid impedance, it is desirable to have a step-down ratio in the coupling transformer.

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### Using a Voltmeter as an Ohmeter

Articles on the use of a low-scale milliammeter in conjunction with shunts and multiplying resistors as a multi-scale instrument have appeared in past *QST*'s. Many experimenters do not know that such an instrument, or any sensitive voltmeter for that matter, may be used as an ohmeter without altering it in any way. All that is required is a source of e.m.f., such as a 22 $\frac{1}{2}$ -volt battery, and a knowledge of the combined resistance of the meter and the multiplier being used. Choose a voltage scale that will give nearly full scale deflection when measuring the voltage of the source. Call this reading  $V_t$ . Then insert the unknown resistance,  $R_x$ , in series with the meter and source and note the reduced reading which we will call  $V$ .

$$\text{Then } R_x = \frac{(V_t - V)}{V} R_m$$

where  $R_m$  is the total resistance of the voltmeter at the particular scale being used.

The formula can be explained as follows:

The difference between the readings  $V_t$  and  $V$

represents the voltage drop across the unknown resistance. This drop is the product of the unknown resistance and the current flowing through it.  $V_t - V = I \times R_x$ . If we divide the voltage drop by the current, we have the resistance. Since the unknown resistance and the meter are in series, the same current flows through each. The current can be determined from the meter reading as follows:

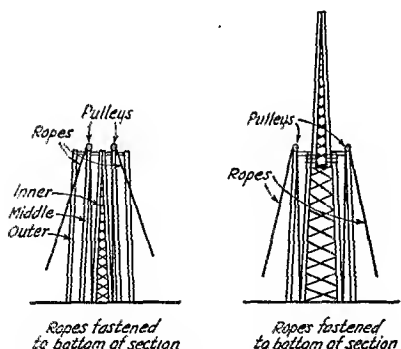


FIG. 4—RAISING A SECTIONALIZED TOWER BY MEANS OF ROPES AND PULLEYS

$$I = \frac{V}{R_m}$$

Substituting, we have  $V_t - V = \frac{V}{R_m} R_x$

and solving for  $R_x$ , we have

$$R_x = \frac{V_t - V}{V} R_m$$

Where greater accuracy is desired, the resistance can be approximated as above and then a scale chosen so that the resistance of the corresponding multiplier is as near as possible to that of the resistance being measured. If the resistance is high, the source of e.m.f. may then be increased to give large scale deflections and permit more accurate readings to be taken.

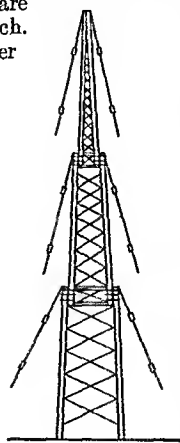
—KA1NA

### Raising a Sectionalized Tower

As everyone who has tried it knows, raising a mast of the order of sixty or eighty feet long in one piece is an awkward proposition, even though the radio club turns out *en masse* to help. One way of simplifying the job was devised by Dr. H. K. McWilliams, of Waller, Texas. His mast is 60 feet high, but the ease with which it went up leads him to believe that an 80 or 100-foot tower could be handled equally well.

The mast—actually a tower of square section, tapering from a width of 30 inches at the bottom to 4 inches at the top—was built complete on the

ground, using “2 × 2’s” as the corner members with lattice cross bracing. It was divided into three sections each approximately 20 feet long, the sections being bolted together with appropriate overlap. When finished, the three sections



were unbolted and the two upper ones telescoped into the largest, or bottom, section. Since the total height of the “collapsed” tower was only about 20 feet, this was raised easily. The bottom section was then guyed at the top. By means of a ladder, pulleys were then fastened to the upper end of the middle section, ropes being run through the pulleys from outside the tower down through the middle section to ground, where the ropes were tied to the bottom of the inner section. Pulling on the ropes then raised the inner section up through the middle; when pulled up to the right height the ropes were fastened securely and the upper and middle sections bolted together. The two left-hand drawings in Fig. 4 illustrate this procedure. The pulleys were then moved to the top of the bottom section, the ropes fastened to the bottom of the second

section, and the upper part of the tower pulled up into place and bolted.

Guy wires are provided at each joint. Higher towers could be raised by providing additional 20-foot sections and following the same procedure. Dr. McWilliams’ tower, although constructed of light material, has successfully withstood several Texas gales.

### Inexpensive Fuses

Every amateur knows the desirability of protecting his equipment from accidental shorts and overloads.

A very satisfactory low-priced fuse, which can be “tailored” to fit practically any amateur application, may be made by procuring some lug terminal strips. These are sold at a very reasonable price and can be had with from two to six

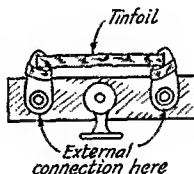


FIG. 5—HOMEMADE FUSE FOR TUBE CIRCUITS

The tinfoil should be pulled through the lugs and wrapped around them for connections. The width of the foil strip determines the current at which the foil will melt.

lugs. The fuse material is “Christmas Tree” tinsel or even the tinfoil from the popular brands of cigarettes. The strips of this material are fastened to, and wound around the lugs as shown in

(Continued on page 84)



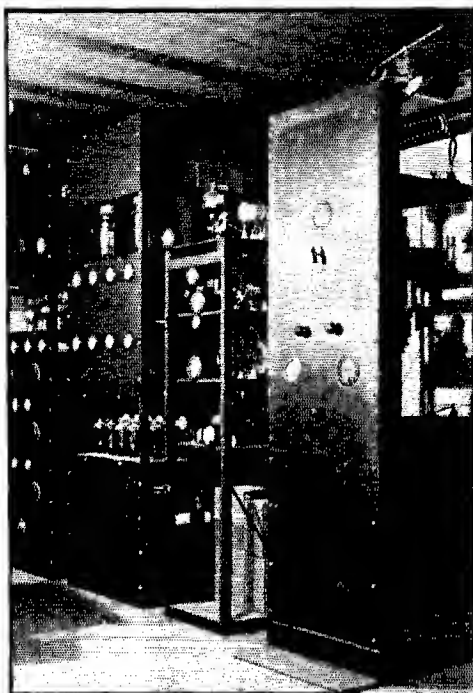
# Amateur Radio STATIONS



## W3SI, Harrisburg, Pa.

**W**3SI, the station of Charlie Myers, is located at 3747 Derry Street, Harrisburg, Pa. The shack is situated at the edge of the city allowing the antennas to be in the open. Myers also operates W3CCF, the first American station to be awarded the WAC on 'phone.

Three transmitters were used at W3SI during the International Contest. Plate voltage for all transmitters is obtained from three power supplies. The smallest furnishes 800 volts at 300 mils



**ONE COMPLETE TRANSMITTER AND ANTENNA SYSTEM PER BAND**

*This station, with Myers operating made a world's record score of 41,000 points in the recent DX contest.*

and operates the crystal and doubler stages. A 2000-volt supply furnishes power for the driver stages and, when using phone operation, the modulators. The supply for the final amplifiers uses a 4.7-KVA transformer giving 4000 volts, this is rectified by two 872A tubes.

The 14-mc. rig uses a 47 crystal oscillator on 3.5 mc., two doubler stages with 825's, an 841 buffer, a 203-A driver and push-pull-parallel 852's in the final.

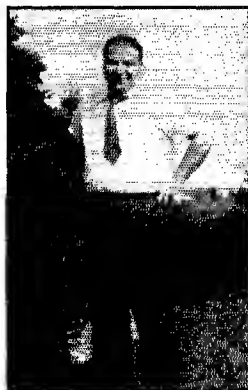
The 7-mc. transmitter uses a 47 crystal oscillator, an 825 doubler, 825 buffer, an 852 driver and push-pull 204-A's in the final. Both transmitters use link coupling throughout.

The 80-meter rig uses two 852's in a push-pull tuned grid—fixed plate self-excited circuit. This was assembled just for the tests to keep from changing coils in the 20-meter rig which normally operates on all bands. Thus, change of transmitters and bands is accomplished by means of a three-pole switch in the high voltage leads from the three power supplies. Seven crystals located in various parts of the band enable the operator to take full advantage of the QML, QLM, etc., signals used by the foreign stations.

The receiver is a superhet using a pre-r.f. stage and a crystal filter. The receiving antennas are connected to a multi-pole switch which allows the operator to select the one giving the best signal. The receiving antennas are as follows: a single wire 120 feet long and 75 feet high, a single wire 450 feet long sloping from 75 feet to 20 feet, a single wire 75 feet long and 15 feet high, a 40-meter doublet with twisted transmission line, a 20-meter Johnson "Q" antenna with a transposed transmission line. (This antenna is switched from transmit to receive by a relay actuated by the power switch on the final plate supply.)

Too much cannot be said about the "Q" antenna as its performance is remarkable both in boosting the signal and dropping the noise level. Auto noise has always been very bad, the shack being located along a main highway. Many antennas were tried but the "Q" was found superior to the others. It is erected 75 feet in the air

*(Continued on page 64)*



**CHARLIE MYERS, W3SI**



# OPERATING NEWS



Conducted by the Communications Department

F. E. Handy, Communications Manager

E. L. Battey, Asst. Communications Manager

95.06% of the registered interest of amateur radio operators is in our four lowest-frequency bands. The remaining 4.94% interest is entirely in the ultra-high frequencies, mostly in 56-mc. 'phone work. 15.2% of all amateur 'phone work is now conducted on 5 meters.

The 56-mc. operator, just like any other amateur operator, is required by the Federal Communications Commission to log every transmission. Neglect in keeping proper station records invites difficulties with the F.C.C. Suppose that you get involved in an F.C.C. check-up, either on your station, or in connection with running down bootleg 56-mc. operation of some station operating in your locality (quite a common activity if we are to judge by the number of unlicensed fellows apprehended mentioned in F.C.C. minutes!). What if your log fails to show stations called and worked confirming your actual operation, or what if you are unable when called upon to produce any log at all? Should your call be "borrowed" and you find yourself confronted with a "situation," a complete record of all actual operation of your station would be invaluable.

Paragraph 388 of the F.C.C. regulations specifically informs every amateur of the things that must be noted when log-keeping: The date and time, the name of the operator, each call made (whether station was worked or not), the input power, the frequency-band, and the location of portable or portable-mobile ham station. The Communications Act gives the F.C.C. the authority to suspend operators licenses for up to two years in addition to liability of punishment on conviction of violation of F.C.C. regulations "by a fine of not more than \$500 for each and every day during which such offense occurs"!

We mention all this *not* to stick up for the logic or justice of paragraph 388 and its manifold sections, but to tell you that there is a regulation, to point out that it is one of the easiest to enforce, and that more-than-adequate penalties are provided. It comes to mind right at this time when we notice hams operating portable-mobile rigs without keeping any proper log of the transmissions made!

Many amateurs are, for their own convenience, keeping a separate and additional log book for recording their portable and portable-mobile ham work. Of course any form of log from notes on a scrap of paper to the most elaborate document will cover the necessities as long as the data on every point the regulations cover is there! However, the book form is best since it has substance enough to support the pencil without backing, and no loose leaves to get lost or misplaced. Why risk suspension of license, or invite the other penalties by failure to keep a proper full record of portable work? Most of us have a good log at the fixed station at home. It saves time and keeps one from forgetting to have one log for the home (base) station and a separate log for the portable rig.

The June 8th-9th Third Annual Field Day is announced elsewhere in these columns. This will be a great Field Day. Don't miss out on it. The winners have previously used 3.5- and 7-mc. portables although increasingly good work has been done on 56 mc. each year. We hope everybody will complete a good portable (it may be 56 mc. or any amateur band) and profit fully from the experience and operating afield that goes with this activity, dedicated to the emergency-preparedness of all us amateurs. In concluding, let us remind you again of the necessity to "keep a log." The second log book is the best way to avoid forgetting, as well as to keep from soiling or mutilating the regular log by rough

handling. It's a good rule to keep this second log always with the portable rig . . . and wherever the set goes, the log book must go also!

## SILENCE THE 5-METER BOOTLEGGER!

This summer should be a great year for 56-mc. fun for all concerned. We expect to see *bona fide* ham interest in 56 mc. top all previous records. Perhaps that 4.94% u.h.f. interest figure which we mentioned as the proportionate amateur interest in these regions will already be obsolete by the time you read this.

Along with the legitimate amateur interest we note with some concern that *sub rosa* unlicensed 5-meter "broadcasting" seems to be greatly on the increase, too. In fact one of the F.C.C.'s field force engaged in running this bootleg operation down gave us some facts. In some big cities there are two 56-mc. illegal stations to every licensed amateur 56-mc. station!

Only 30% of the stations one good Pittsburgh amateur worked recently on five meters were licensed amateur stations! Seventy-six different stations were worked, and of those unlicensed it was ascertained that over half do not even try or care to try to obtain licenses. At present about two hundred stations are estimated to be operating in the Pittsburgh district, about eight of them using linear oscillators and five employing m.o.p.a. jobs. The unlicensed jobs are usually of the poorest quality. It is believed that this situation is entirely representative of that which obtains in other large cities.

Interference from these bootleggers is a nuisance. Federal Communications Commission efforts are largely effective in silencing these unauthorized stations as fast as located, the chief delay in many instances being that of running down the pirates by someone with a badge of authority. Page 45, February 1935 *QST*, and page 7 of May 1935 *QST*, covered our personal and club responsibilities in taking care of 56-mc. unlicensed operators in each locality. It is strictly up to us individually whether we will continue to tolerate trespassing in our all too-narrow bands on the part of large numbers of B.C.L. novelty-seekers who have neither the qualifications, or the ability, or the desire to acquire same, to make this grade and become *real amateurs* by learning the code and training themselves in operating technique, which as well as snapping switches on transceivers, is required to make one of potential value to Uncle Sam, and to warrant his recognition in the granting of all-important station and operator licenses.

To help ourselves we have only to cooperate with our U. S. Radio Supervisors and the field offices of the F.C.C. After information and advice has been freely tendered these 56-mc. bootleggers without result, the sensible course is to tell the story to one's Supervisor to get relief. After all we are the folks who are going to get hurt if this situation is allowed to get out of hand. Local monitoring of our bands, giving of uniform advice, and equitable handling of cases is interesting work best carried on by your local amateur radio club. Inquire there what is being done about this subject. Pool information on "call bootlegging" there and turn it over to those the club has in charge of this work. If nothing is being done there to maintain our amateur bands for amateurs, it is time the matter was put forward for discussion.

—F. E. H.

## The 1935 160 Meter DX Tests

HERE is a summary of my results in this year's 1.75 mc. DX tests.

The following stations were heard at G2II: VE1EA, W1GBD, W1DBM, W1BB, W1BKL, W1DVC, W1HVF, W2BFA, W3CWW, W3AJS, W8ASI, and W8UV.

W1BB (500 watts input) was the most consistent W station heard. His sigs were a solid R5 for long periods on some mornings, and very pleasant to read, being quite free from severe fading. W1DBM was unfortunately unable to be on for more than one week end during the tests, but on that one occasion he was a good R8 (Feb. 10th). If he had been able to be on consistently, I feel sure he would have rivalled W1BB for being the best W station.

W2BFA was the second most consistent W here. This is most remarkable since his input was only "thirty to forty watts to two '47's in the PA of a CO-PA transmitter!" W1BKL was R7-8 on one occasion, and R4 on another, but was not heard consistently.

On Feb. 10th at 06.25 G.M.T., I was successful in contacting W1DBM, who gave me R 2/3 QSA2. This was the first W-G contact of the season, as far as I know. On March 10th I QSO'd VE1EA for three quarters of an hour. His average strength was R4, QSA 3/4, and mine R3, QSA3. I was successful in receiving his contest number, but was not taking part in the contest myself. VE1EA's input was 72 watts during our QSO. Some G hams have told me that my contact with VE1EA was the first G-VE contact on a 1.75-mc. band. All G stations are prohibited to use over 10 watts on the 1.75-mc. band.

After all 25 watts is not exactly high power, is it? As far as I know I was heard by VE1EA, W1DBM, and W2BFA, who have written to me with reports. W2BFA and W8UV both tell me that quite a number of W stations were calling me on March 10th when I was working VE1EA, but as I didn't tune off him I missed all their calls. This was unlucky, as G6OK about one and a half miles from my location, could hear W2BFA and W8UV calling me, but didn't like to QRM my QSO with VE1EA to tell me. W2BFA said W3AJS was calling me on March 2nd and 3rd.

G6OK was heard by W8UV, and G5WU by VE1EA, but unfortunately proper contact was not established in either case. G6OK was using an input of 8 watts when heard by W8UV!!

My sigs were heard in CT3 (Madeira) during the tests, by G5MP who is staying there. When I heard W8UV on March 3rd, he was working W6DIO, thus W8UV's 1.75 mc. sigs were being heard 3000 miles east and west of his QRA at the same time!!

The tests were from 5 a.m. to 7 a.m. English time so we G's have to be very firm with ourselves to get out of a warm bed at that time on a winter morning! In addition to getting up at 4:30 a.m. each morning of the tests, I had to walk about a quarter of a mile to my shack, which is situated on a hill some distance from my home. It can be very cold at that time on a February morning in North Wales, but it was well worth it to get the thrill of hearing stations from across the Atlantic on "160"!

I think I can call myself quite a "hard boiled" DX man, having WAC and 60 countries on 7 and 14 mcs. and skedded Arctic Expeditions, etc., but I have never had a thrill to touch the one I got that morning when I worked W1DBM on 1.75!

You might be interested to know that when conditions were bad, and no W stations audible, they would suddenly appear for about 10 minutes just at sunrise here, and then fade out. Under normal conditions signals reached a maximum at about 0530 G.M.T., and then gradually diminished until sunrise. On one occasion, however, W1BB was heard 35 minutes after sunrise. G6OK's remarkable feat was accomplished just at sunrise, but unfortunately severe QRM from VE fone prevented W8UV from getting G6OK's report, and when QRM had stopped, the sun was up here, and all was dead!!

In my opinion (and G6OK, G5WU, and G2DQ agree) it would be better to start the tests in the middle of January next year, and end in the middle of March. In late March the sun is rising at about 0800.

Next year I am going to try to persuade CT3, CT2, and VO hams to take part in the tests, using as much power as possible. The VO hams should stand a good chance of getting over to G, while the CT2's, out in the Atlantic, could possibly hear both sides, and QSP reports across.

In the 1800-2000-kc. fone band, I heard some W fone hams, but didn't identify them, as I was too busy logging the stations in the 1715-1800-kc. band who were calling specially for our benefit. 73.

—David S. Mitchell, G2II

## More on the Duluth Sleet Storm

By C. R. Johnson, W9HZ

THE morning of March 5th found the Northwestern Bell Telephone Co., the Western Union, Postal Telegraph, and all brokerage houses without wire service out of Duluth. All of the hams awoke to find Zepps and Hertz antennas draped over clothes lines and lying peacefully on the ground. Besides, the greater majority of the hams were without 110 volts a.c. Those who did have power, could not rely upon the supply as power lines were crashing down all through the day.

The first Duluth hams on the air were W9GRH and W9KRH. These two stations handled important Associated Press traffic before falling power lines interrupted their power supply. W9HZ, Duluth, dismantled his transmitter and hauled it to the downtown telephone office where constant 110 volts a.c. was available. A novel type of remote receiving system was used. Because of heavy Q.R.N. in the downtown section of the city, a battery SW5 was set up at the transmitter location of the local police radio station on Minnesota Point. The output of this receiver was fed by direct phone line to the operator at the transmitter. Of course the receiver had to be tuned but this was taken care of by whoever was the operator on watch at the police transmitter. W9BHH, W9HZ, and W9KNR alternated as receiver tuners. W9HZ was in operation at about 11:30 a.m. March 5, 1935, it maintained schedules until 5 p.m. March 6, 1935, when commercial services reestablished circuits to the outside world. Much vital traffic was handled for the Associated Press, Western Union, Northwestern Bell Telephone Co., Minnesota Power & Light Co., the Soo Line Railroad, the Northern States Power Co., and the Northern Pacific Railroad. Operators at W9HZ were: W9CDV, W9GKM, W9BHH, W9HZ, and W9KNR. Schedules were kept with W9LHP at St. Paul, W9HCC at Minneapolis, W9BN at Minneapolis, W9IDJ at Two Harbors, Minn.; W9HED at Paynesville, Minn.; W9HDP at Superior, Wisc.; W9KRH at Duluth, W9EQR at Minneapolis, and W9GYH at Leoneth, Minn.

W9HDP—Had constant power and no difficulty with antenna, but was unaware of the emergency until 2 p.m. March 5th. He handled traffic for Amer. Tel. & Tel. Co., Minnesota Power & Light Co., and also personal messages. Schedules were kept with W9HRB at St. Paul, W9GBN at Crosby, Minn., W9HZ at Duluth, W9LEX at St. Paul, and W9NNO at Minneapolis. W9DXI, Superior, Wisc.—Tried battery powered rig but was unable to contact outside. W9KRH, Duluth, Minn.—One of the first stations on the air. He had to retract his hertz, stand for several power interruptions but came through with colors flying. Thirty-five messages were handled by W9KRH, their classifications: Associated Press, United Press, Postal Telegraph, and Personal. Schedules with W9HCC, W9CYX, W9FTJ, W9GQP, W9IDJ, W9HDN, W9CGO, and W9GBN. W9SLL, Duluth, Minn.—This station was on the air from noon March 5th until 6 o'clock that evening. He had difficulties with falling antennas, and frequent power interruptions. His traffic: Ten very long copyrighted Associated Press dispatches for the local papers. His schedule was with W9IBD at St. Paul. W9ASQ, Superior, Wisc.—This station was without an antenna but a temporary one was strung in the attic. Seventeen messages were handled, details as to schedules not known. W9ELE, Duluth, Minn.—This station was on the air from 1:30 p.m. March 5th until 9:30 p.m. of the same date. During this time an antenna was rebuilt, one xtal was

broken, and four messages were handled; W9RPK, Duluth, Minn.—This station had to erect a new antenna. Three messages were handled via a schedule with W9HGN. W9RZY, Superior, Wisc.—This station handled one message with W9ENE of Ashland, Wisc., for the Northern Pacific Railroad. W9HDN, Nopeming, Minn.—This station is located at the Nopeming Sanitarium about twenty miles from Duluth. W9HDN had no telephone connections with Duluth but gave valuable aid by gathering incoming traffic and relaying it to Duluth stations on schedule. W9IDJ, Two Harbors, Minn.—This station was the only contact for the city of Two Harbors with the outside world. Important traffic was handled for private concerns and the Northwestern Bell Telephone Company.

The Duluth and Superior Amateurs wish to express their appreciation for the wonderful cooperation received from the outside stations during this emergency. The most outstanding work was done by the St. Paul and Minneapolis hams. Outstanding among these were W9LIP and W9HCC. W9LIP stayed with W9HZ continuously from noon, March 5th, until midnight the same evening. During this time traffic was moving in one continuous stream between these stations. Many thanks W9LIP. W9HCC also handled a lion's share of the traffic. After maintaining an all day schedule with W9KRH, Duluth he took over W9LIP's schedule with W9HZ. Rumors also have it that when he heard of the QRR, W9HCC made the seventeen-mile trip from downtown Minneapolis to his home in twenty-one minutes. HI

### DX Notes

SUIRK is a new station at Port Said, Egypt. Watch for SUIRK 1600 to 1800 G.M.T. on 14,200 and 7100-kc. . . W9FLH was QSO XU6F on 14 mc. at 7:30 a.m. C.S.T. April 29th. QTH: Fung Him Aviation School, Lieuchow, Kwangsi, China. Frequency was about 14,300-ke., d.c. note. . . Believed to be the first QSO between the W9th district and Palestine occurred when W9FLH worked ZC6FF last summer. . . W7BB will be signing K7BB at Mist Harbor, Alaska (in the Shumagin Islands) after May 15th. Look for him on 7050 kc., 1000 cycle note. . . NX2Z, the only permanent station in Greenland, was worked by WITS at 10:00 a.m. E.S.T., March 17th. NX2Z is on about 14,010 kc. each Monday, Wednesday and Friday at 3:00 p.m. E.S.T. . . W9FDL recently worked HC1FG on 3.5-mc. . . W8BDV, Auburn, N. Y., has been heard in the Canary Islands on 1777 kc. by G5MP. . . During December '34 WIDIK, Rumford, R. I., was heard on the 1.75-mc. 'phone band by G5BI and BRS-1422. . . Worked by W2GWE during the DX contest was TF3LX, Reykjavik, Iceland. Frequency was close to the 7000-ke. edge of the band. TF3LX operator has been in that "north country" for twenty years and can copy 40 w.p.m. . . W2AEW was QSO I11Y on about 14020 kc. I11Y is on every night and is anxious to QSO K4 and K5 stations. He has a d.c. note. . . W8ZY, Ohio, sends some interesting items: He worked FB8C on 14 mc. the long way around at 11:15 a.m. E.S.T. He has been working such stations as VS8AQ, VS8AG, both 14275 kc., PK3ST 14150 kc., OM2RX 14220 kc., KA1CS 14250 kc., XU6F 14250 kc. Among the J's heard best at W8ZY are J2HG 14380, J5CE 14350, J2HLJ 14330, J2LU 14110, J3DE 14230, J2GX 14330. These stations are coming through regularly from 1200 to 1350 G.M.T. along with ZLs and VKs. The latter are also fine from 10:30 p.m. to midnight E.S.T. On May 5th W8ZY worked VK2EO both ways around. FB8C makes 91 countries worked at W8ZY. . . W3UVA has also worked VK2EO both ways around on 14-mc. . . W8CNC, Ohio, worked ZL4AI on 3.5 mc. at 3:00 a.m. E.S.T., March 14th. ZL4AI's frequency is approximately 3527 kc. W8CNC reports VK and ZL signals coming through very well on 3.5 mc. from about 2:00 a.m. to 6:00 a.m. E.S.T., VK3WR coming through QSA5 R7 plus almost every morning on 3575 kc. W8CNC has worked all continents on 3.5 mc. since December 9, '34, and has worked 52 different stations on that band. . . A nice hit of 14-mc. 'phone work is reported by ex-VE3LJ. He was visiting HP1A in Panama City, Hooking VE3HE in Toronto he gave him a message for delivery; VE3HE phoned the message and gave HP1A the reply, all within 3 1/4 minutes. . .

W1LZ, Somerville, Mass., worked all continents on 14 mc. on May 5th. Stations worked and time worked: J2HG 0836, ES7C 0900, LU6AX 1825, VK4AP 0850, FM8CO 1800, VO1P 1840. . .

## "CQ DX"

By Duane Magill, W9DQD\*

The following contribution by Mr. Duane Magill, wins the C.D. article contest prize for this month. Your articles on any phase of amateur communication activity are likewise solicited and may win you a bound Handhook, six logs, or equivalent credit applied toward other A.R.R.L. supplies. Let us have your article, and mark it "for the C.D. Contest," please.

— F. E. H.

CQ DX is a mighty common call on the 7- and 14-mc. bands, and a most useful one, too. But perplexing sometimes, for all that, since probably no two hams would agree exactly as to just what constitutes DX. It is in the hope that some definite standards as to DX can be evolved that this article is being written.

Consider this case, for example: I am listening in the 7-mc. band, and hear a K6 call CQ DX. Puzzle: am I, a W9 but near the W6 line, DX in Hawaii? I hardly know whether to call him or not, for while some K6's would no doubt welcome W9 with open arms, others would feel disgusted, resentful that I had wasted their time by butting in. Again: is Colorado DX in, say, Central Mexico? I doubt if any W is exactly what an X1 has in mind when he calls CQ DX, yet such QSOs count in the International Contests, and many W's consider Mexico fair game when hunting DX. Obviously, some sort of more exact criterion as to what constitutes DX is demanded.

Now, to start off, I think we will all agree that stations inside the same country are *never* DX to each other, and of course this rule would apply throughout the whole W/VE area as well. It is granted, of course, that many interesting QSO's over considerable mileage can be had within some of the larger countries; still, such contacts are not what the average amateur has in mind when he thinks DX, and he has a perfect right to feel resentful when he gets an answer to his CQ DX from within his own country.

Now we are beginning to get somewhere, but let us carry the investigation a bit further. France and Spain, say, are not the same country, yet contacts between them are certainly not DX. Obviously, some sort of mileage limit is needed in addition. After thinking the matter over quite carefully, I have come to the conclusion that 2,000 miles is the best all-around division to use in dividing DX from non-DX. It is obvious that no definite figure will be entirely fair in all possible cases and with all amateurs, yet a definite figure is necessary, and 2,000 miles and over constitutes DX to most of us. Another advantage in using this figure is that 2,000 English miles is roughly the equivalent of 3,000 kilometers, giving amateurs in countries using the metric system an equally satisfactory round number to use.

And thus we have quite simply arrived at a reasonable solution of the problem of just what is DX. Next time you hear a station calling CQ DX, ask yourself these two questions: Is he outside my country? Is he more than 2000 miles (or 3,000 km.) away? If the answer to both questions is "yes," then well and good, and let no ham feel offended if he gets answers on that basis. If the answer is "no," then heave a sigh of regret and look for somebody else. And if any amateur does not care to work stations on such a basis, then let him be more specific, and give the prefixes of the countries he *does* want to work. In nearly all cases, however, I feel that this method of defining DX will work satisfactorily, and will result in more pleasurable DX work for everybody concerned.

\* 730 N, 6th St., Grand Junction, Colorado.



## Briefs

W5AEB, Brian, Texas, and W8EFX, Wilkinsburg, Pa., some time ago played three games of chess on 14-mc. 'phone. The series started about 2:00 p.m. on a Saturday; one game and half of a second were played the first afternoon; the second game was finished and the third played the next day. Total time for the games was about seven hours. W5AEB won two games; W8EFX won one.

W9CVL tells of some interesting 'phone work he intercepted on 14 mc. one afternoon. It was a five-way, three-hand hook-up consisting of W2TP, W6CNE and K6CMC on 14 mc., K6BAZ on 3.9 mc., and W6CKR on 1.75 mc. W2TP, on 14 mc., was received at W6CKR, who retransmitted on 1.75 mc. to W6CNE, who in turn retransmitted to Honolulu via 14 mc. K6BAZ, on 3.9 mc., was retransmitted on 14 mc. by K6CMC to W6CNE, who boosted the signal on to W2TP.

## Ham Radio to the Rescue

W9SZW, a dentist, who has his station located in his office, was QSO W9JJF on 'phone. At home his wife was listening in to him. After a few of the customary remarks, W9SZW asked W9JJF to stand by, "There's some one at the door." Then his wife began to hear things coming from her loudspeaker, which made her sit up and take notice: "Put up your hands and give us your dough!" . . . "Don't shoot! Don't shoot!" . . . "Look him in that closet" . . . "But what if he croaks?" . . . "Let him croak" . . . Mrs. W9SZW had heard enough! She called the police, grabbed her hat and hurried to the office. Forcing the door with the aid of the janitor, she freed her husband, who was hound and gagged in the closet. All this time W9JJF had been standing by! W9SZW to W9JJF: "Hello, 9JJF. I've just been rohhed and nearly killed. If my wife hadn't been listening, I would have smothered to death." There's always a new thrill awaiting in ham radio!

W9KA answered K5AG's directional CQ and took a message for W9FO. Upon 'phoning it to W9FO it was found to be a reply to a message that FO had sent to the Canal Zone just fifty minutes earlier! K5AG sure did some fast work!

## W2DYH Suggests—

If she wants a date, Meter; If she comes to call, Receiver; If she wants an escort, Conductor; If she's a poor cook, Discharger; If she is wrong, Rectifier; If her hands are cold, Heater; If she talks too long, Interrupter; If she eats too much, Reducer; If she wants chocolate, Feeder; If she wants to be an angel, Transformer; If she is up in the air, Condenser; If she is picking your pockets, Detector; If she is narrow in her views, Amplifier; If her views are not yours, Corrector; If she fumes and splutters, Insulator; If she is slow of comprehension, Accelerator.

At 5:10 a.m., February 8th, W2FBS took a message from VP4BA, British Honduras, telephoned it to the addressee and had an answer back at VP4BA by 5:18 a.m.

From the Alberta S.C.M., VE4GD, additional information is received on the part played by VE4's in the January snowstorm. In Edmonton, Alberta, on the main line of the C.N.R., VE4HM handled the bulk of the C.N.R. work. Army stations at Calgary and Edmonton handled the bulk of commercial messages although amateurs were called on to handle the overflow. VE4HV, operating at VE4FI, handled over 60 that the Army stations were unable to push through. Other stations handling traffic were VE4NH, VE4NC, VE4SC, VE4HQ, VE4DX, VE4NJ, VE4AF, VE4BZ, VE4OG, VE4OF.

Both VE4HM and VE4LX made the front pages of their local newspapers and ham radio received well deserved advertising.

While in Memphis W4AXN, along with W4ABY and W4OI, went to the Tri-State Auto Show to hear Jonnie Hamp and his band. After the show he got separated from the others, and upon reaching the car he called CQ on the horn; he was answered by a Pittsburgh ham. W4ABY and W4OI finally came along and as the three were driving off, they tried another CQ . . . this time they raised none other than W8IJK, who turned out to be the cornet player in Hamp's band!

## Code Practice

W8LQW, New Castle, Pa., is transmitting code instruction on 1900 kc. every Monday, Wednesday and Friday from 7:15 to 8:00 p.m., E.S.T. If you live in the vicinity of Richmond, Va., and are looking for code practice, the Richmond Short Wave Club has regular code classes with W3AMB as instructor. W9XBY, Kansas City, Mo., on 1530 kc. transmits a program of code lessons, known as the "Dot and Dash Club," every Monday, Wednesday and Friday from 5:30 to 5:45 p.m. C.S.T. A complete list of 1.75-kc. amateur stations sending code practice will be mailed by A.R.R.L. HQ's to anyone requesting same.

## 4th District, 1.75-mc. 'Phones

W4CXB, F. R. Greene, 18 East 8 St., Hialeah, Fla., invites all Fourth District 'phones to write for a sample copy of "Harmonics," 1.75-mc. 'phone gossip sheet. It is a weekly paper, well prepared and extremely interesting and hammy.

W8JMJ tells of his "chain letter gang." It was the brain child of W8GBG, who, having so much correspondence to take care of, found himself with little or no time left to pound brass. That condition was too serious to be allowed to exist so he figured out a way to make one letter do the work of seven. He now writes a letter to seven of his most persistent "corresponders" and mails it to number two. Number two reads the letter, adds his own letter to the gang, mails it to number three, and so on until it reaches number seven, who returns the whole bunch to W8GBG. He then adds a new letter and starts the whole bunch around again. The seven in this particular "gang" are W8GBG, W8LAU, W8JMJ, W2HHY, W2GWJ, VE3AAG and W8GHP.

Another father-and-son schedule: If W6AM is late home for dinner, one of his two boys (ages 10 and 12) gets on the air on the 56-mc. set and W6AM, using his 50-watt 56-mc. portable tells the family where he is. Mrs. W6AM, who is licensed, takes care of the equipment, while the boys operate.

During a recent illness of W4PL's mother, a fine example of true amateur cooperation was shown by W4DAX, W4DBR and W4BDF. W4PL, Shepherd, Tenn., arranged a schedule with W4DAX, Knoxville, Tenn., for the purpose of sending daily reports of his mother's condition to an uncle who lives in Knoxville. W4DAX faithfully kept the schedules for ten days. During this time his receiver went out and W4DBR loaned his receiver for the remainder of the schedules. All this time, W4BDF, who operates on the same frequency as W4DAX, remained off the air so there would be no difficulty in getting the traffic through.

## Break-in

Several suggestions have been received relative to adopting some special "sign" so that one amateur would know another was using break-in before starting a QSO. It seems superfluous to add any more special "signs,"

if the following procedure is used: Let every station that uses break-in simply call in the usual manner, but upon signing his own call add the letters "BK." which, of course, means "break me," and indicates immediately to the other operator that you are using break-in; if he is using it also, everything is FB; if not, he can still break-in, tell you he isn't equipped for break-in and continue with the QSO. An example of the suggested procedure for stations using break-in: W1XXX W1XXX DE W2XXX W2XXX BK. . . If the other station doesn't break-in right away, just go right ahead with another short call, and then another "BK." Of course, if the station you're calling gets another station, you'll hear him right away and a minimum of time will be lost. Every station should be equipped for break-in operation.

### More on the SS

The excellent work of W2GWE (W2FIS opr.) in the 1934 Sweepstakes Contest was not properly credited in the May QST article. W2FIS operating at W2GWE made 86,121 points. This score was the highest of those operators in the medium and high power group (those using multipliers of 2 and 1)! It was also fifth high of all scores! Contacts were made in 63 sections and with more than 550 stations! W2FIS was also the highest scoring operator in the Nassau Radio Club of Oceanside, L. I. W4CQD (E. Fla.) advises that his score was 14,726; his log apparently became lost in transit since it was not at hand when the scores were checked. Late reports were received from W9IO (opr. W9LEF), Iowa, 9042, VE3RK, Ontario, 2071, and VE3MX, 40. VE3WY with 10,092 points is winner in the Ottawa Amateur Radio Transmitting Association. W1ACV tells of an interesting incident during the SS: He prepared his messages in advance, Number 4 read "There were three little pigs"; his fourth QSO was W6HOG, who replied, "And don't you forget it." One amateur worked by W1MK during the SS asked, "QRA?"! Hi.

### Lansdowne Radio Association Hamfest

A hamfest will be held by the Lansdowne (Pa.) Radio Association on June 1st in celebration of its 16th anniversary. All amateurs are invited and are guaranteed an FB time. The place: Hotel Normandie, Philadelphia.

Other hamfests scheduled for June include those to be held by the South Jersey Radio Association (write J. T. McLamore, 105 Warwick Rd., Haddonfield, N. J., for details), by the Framingham (Mass.) Radio Club, June 1st, by the Halifax (Nova Scotia) Amateur Radio Association, June 1st-3rd (write VE1FN), by the High Frequency Communications Association, Moline, Illinois, June 9th, by the Forest City Hamfest Committee, Moline, Ill., June 16th, by the Medina (Ohio) County Radio Club, June 16th, by the Sheboygan and Fond du Lac (Wis.) Radio Clubs, Round Lake, Wis., June 16th, by the Albany (N. Y.) Amateur Radio Assn., June 22nd, and by the Central Illinois Radio Club, Bloomington, Ill., June 23rd. Amateurs in the vicinity of any of these points should try to be present and "meet the gang".

On April 10th the following stations participated in an 8-way QSO on 3.5-mc.: W2ENZ, W2DUP, W2CCZ, W4BJA, W6FOM, W7BVE, W9RYD, W9RMN.

W2HAN, new Route Manager for the Metropolitan New York 56-mc. Net, reports the following Key Stations: New York City—W2AJB, W2HPW, Alternate; New Jersey—W2HIT, W2CVF, Alternate; Long Island—W2UX, W2FQA, Alternate; Westchester—W2CHC, W2IEC, Alternate. W2GPB is Alternate R.M. Connections with trunk lines are furnished by W2HAN and W2GPB.

Of interest to ultra-high frequency enthusiasts will be the frequencies used by W2XBM, R.C.A., New Brunswick, N. J., and W2XHG, N.B.C., New York City. W2XBM operates on 86,000 to 400,000 kc., and 401,000 kc. and above., W2XHG operates on 25,700, 26,000, 27,100, 21,100,

## BRASS POUNDERS' LEAGUE

(Mar. 16th-Apr. 16th)

Call	Orig.	Del.	Rel.	Total
W9ILH	10	70	1512	1592
W9RYD	120	182	1028	1330
W9BSA	104	242	926	1272
W9WFI	103	71	1052	1222
W3OK	303	38	848	1189
W9FLG	53	169	858	1080
W3BND	198	193	687	1078
W8JTT	47	34	966	1047
W8BMC	8	22	1004	1034
W9KTA	12	16	978	1006
W2CNK	65	216	656	937
W9KJY	72	91	764	927
W8ERY	9	12	872	893
W5CEZ	76	132	664	872
OM1TB	368	126	329	823
W9JID	94	203	512	809
W6AXN	20	11	764	795
W2BCK	35	29	677	741
W8C1O	2	84	610	696
W8DVC	31	34	586	651
W3BWT	83	119	443	645
W9WVW	13	33	566	642
W5MNY	58	432	139	629
W8RY	120	20	485	628
W8GUF	20	36	560	616
W8FLA	43	36	534	613
W6KGO	12	589	39	609
W7WY	26	48	541	609
W8ADY	7	30	572	599
W9IQI	136	107	361	604
W9PAM	16	12	576	604
W7BB	196	198	208	602
VE3QK	38	76	476	590
W9MZD	42	26	522	590
W3AKB	16	36	534	583
W3ADM	559	16	1	576
W8DWB	18	28	515	561
W6FQU	853	109	82	544
W1GME	50	47	440	537
W8DSS	80	71	384	535
W9LEZ	66	66	400	532
W2EGF	22	22	474	518
W9QVY	405	59	51	515
W9PWU	179	65	267	511
W8KWA	9	22	480	511
W6FOM	19	12	490	511
W1MK	39	106	364	509

### MORE-THAN-ONE-OPERATOR STATIONS

W9BNT	265	799	1071	2135
W6ZG	688	859	243	1790
KA1HR	558	442	376	1376
W8SN	240	136	784	1160
W8JRK	49	51	700	800
W3CXL	47	73	441	561
W5OW	32	245	263	540
W8NLG			538	538

These stations "make" the B.P.L. with totals of 500 or over. Many "rate" extra credit for one hundred or more deliveries. The following one-operator stations make the B.P.L. for delivering 100 or more messages; the number of deliveries is as follows: Deliveries count!

W8KMC, 202	W7DUE, 120	W5CPB, 100
W1GZL, 177	W2CHK, 119	W9ERP, 100
W7KL, 140	W2DBQ, 117	More-than-one
W6JJA, 138	KA1EE, 114	W6EK, 109
W3ANT, 137	W6EBK, 101	

### A.A.R.S. STATIONS

Call	Orig.	Del.	Rel.	Total
WLMG (W2BZZ)	20	15	1329	1364
WLRH (W4AFM)	5	1	746	752
WLVB (W8BMC)	5	26	502	533
WLNLM (W2CHK)*	10	146	14	170

### MORE-THAN-ONE-OPERATOR STATIONS

WLM (W3CXL)	146	171	1533	1850
WLV (W6ZG)	449	471	228	1148
WLJ (W5OW)	256	133	715	1109
WLMA (W8YA)	11	10	721	742
WLVK (W6EK)*	6	124	68	198

A total of 500 or more, or just 100 or more deliveries will put you in line for a place in the B.P.L.

\* B.P.L. rating on deliveries.

31,600, 34,600, 35,600, 37,600, 38,600, 40,600, 41,000, and 86,000 to 400,000 kc.

W9TLM, Denver, Colorado, is transmitting code practice on 1867 kc. every Wednesday at 7:00 p.m. Mountain Time.

W2HCV was visiting W2CJP. A third district station was heard calling CQ. They called and raised him; QRA was Norfolk, Va., W2HCV asked if it would be possible to QSP a message to his son aboard the U.S.S. *Ranger* at Ports-

mouth, Va. The reply came back, "Sure, I happen to be a radio operator aboard the *Ranger* and can deliver that message when I return aboard ship." Message was sent and delivered in two hours!

W3KW has had ten years commercial operating experience at sea and at coast stations, and has operated amateur stations since 1914. For a year and a half he kept a consistent Central American schedule, handling volumes of important messages; also a six month schedule with the west coast. Let's hear of more such good amateur records.

## Philippine Regulations

IN THE Philippine Islands amateur station licenses are issued to citizens of the U. S. A. or the P. I. by the Director of Posts. Since early 1933 the Philippine government has been studying the subject of communications regulations. In September the Philippine Amateur Radio Association received a copy of the tentative regulations for comment, these patterned quite closely after our own F.R.C. regulations for amateurs as to basic definitions of the amateur service, but differing in a number of respects due to the fact that the Philippine government controls the inter-island communications system, as well as receives a percentage of all revenues constituting international business.

Prior to February 12, 1932 amateur stations in the Philippines could be operated for "purely experimental purposes only." On that date the P. I. legislature enacted a new law, drafted in the Bureau of Posts, liberalizing the regulations of amateur stations by removing this restriction, controlling radio operations by flexible administrative regulations. These rules, indicated by experience, have now been worked out by the Philippine government, and the proposed amateur regulations commented on by the P.A.R.A., the representative traffic-handling group of amateurs. The government has incorporated the suggestions made by the P.A.R.A.\* (for incorporating licenses for portable stations, removing "guard" bands of 20 to 50 kcs. near each band edge and allocating all territory permitted by international agreements to P. I. amateurs, raising authorized power input from 500 to 1,000 watts, and reducing the period for preserving traffic files for government inspection from one year to six months), making the department order effective Jan. 1, 1934.

Sections 21, 22, and 23 of the order issued by the Department of Public Works and Communications, Manila, P. I. deal with "communication regulations" and will be chiefly of interest:

21. *Communication with countries other than the United States.*—Philippine amateur stations communicating with countries other than the United States may handle the same type of messages as those allowed amateur stations of the countries concerned in communicating with the United States under special agreements entered into between the United States and such countries. In the absence of such agreements and in the absence of notice of opposition to the exchange of communications, Philippine amateur stations may transmit or receive only plain-language messages "having to do with experiments and remarks of a private nature for which, by reason of their unimportance, there could be no question of resorting to the public telegraph service." In this case, "communications emanating from third parties" (that is, from persons other than the owners of the stations) shall not be transmitted, received or delivered.

22. *Communication between the Philippines and the United States.*—Philippine amateur stations communicating with the United States may transmit or receive plain-language messages or remarks of a private, personal or social nature, including those emanating from third parties; *Provided*, That no hire or material compensation, direct or indirect, paid or promised, is involved or received. Under no circumstances shall a Philippine amateur station owner or operator transmit, receive or deliver a commercial or business message. As a general rule, a "commercial" or "business" message shall be understood to be that which relates to the business of any person, firm, corporation, association or organization.

\*J. R. Schultz, KAIJR, Lt. Meyer of KAIHR, and N. E. Thompson, KAIXA, A.R.R.L. SCM were appointed as a P.A.R.A. committee to protest third party traffic and other restrictions as first proposed by the P. I. government radio committee.

23. *Communication between amateur stations within the Philippine Islands.*—An amateur radio station may exchange with another amateur station within the Philippine Islands purely personal messages of the owners or operators thereof; *Provided*, however, That if one or both of the two stations is or are in a place or places not served by a public communication system (telegraph, telephone or radio) messages of any type or nature from third parties may be transmitted, received or delivered, the only condition being that no hire or material compensation, direct or indirect, paid or promised, is involved or received.

Mr. Thompson, A.R.R.L. SCM of the Philippines has been closely in touch with the situation throughout the formulation of the regulations now effective. He writes that the Superintendent of the Telegraph Division, Bureau of Posts has no objection to amateurs handling third-party traffic in the P. I. provided the messages are personal and not commercial or business. Mr. Thompson points out that P. I. amateurs never have accepted messages from firms or individuals who deal in buying and selling of goods or merchandise to be sold for profit, and not for individual use; that therefore there is no cause for concern here since the practical effect on amateur work as it has been going forward will be "nil."

In conclusion then, paragraph 22 restricts Philippine amateurs, stating that third-party messages of "a private, personal or social nature" may be handled, and prohibiting radio handling of "commercial" or "business" messages to the United States by amateur radio. A.R.R.L. Headquarters has been closely in touch with this development at Washington, and in fact the suggestion has been sent to the Philippine government that our U. S. radio administration regards such a prohibition "unwise and very difficult to administer, since not always possible to say whether a message would be sent by cable." It should be noted that no restriction or test except the basic test of compensation in message handling is placed on U. S. amateurs by the Federal Radio Commission; that the regulations quoted are not F.R.C. regulations, but P. I. regulations for P. I. amateurs.

## Briefs

W9LBI worked W5BZT, Jacksonville, Texas. Upon signing with him, W5ANU, also of Jacksonville, called. A visiting ham was at W5ANU and he also had a word with W9LBI. Thus did W9LBI talk with three Jacksonville, Texas, hams inside of fifteen minutes.

A six-way QSO on 56 mc. on January 4th started at 1:36 p.m., ended at 5:22 p.m., and included the following. W2HCY, W2EYD, W2HQJ, W2HG, W2EKC and W2EYS. We nominate these lads for the "rag chewers club"!

## QPD

W2DSH, O.R.S., has suggested a Police Radio Net. The main purpose of the net is the spreading of information for the various police departments, especially to points not reached by the regular teletype systems. Several O.R.S. have already taken definite steps towards lining up with their local departments.

W2BGO, Bronx, N. Y., reports that he will use the signal "QPD" in advance of transmitting any information for the New York Police Department. This signal—"QPD"—will mean "Attention, Police Traffic." By March 1st W2BGO says there will be daily traffic originated at his station by the New York Police, going to police departments throughout the country. The signal "QPD" might well be adopted by all amateurs cooperating in police work.

"CQ TFC" is the general call used in the GENERAL TRAFFIC PERIOD—6:30-8:00 p.m. (local time). Use this period to move your traffic through reliable stations. Operators who sign "ORS," "TLS," "RM" or "SCM" after their call are sure to be "reliables." The very use of "CQ TFC" by any operator indicates an interest in reliable traffic work. Cooperate with the stations using the TRAFFIC HOUR!

On January 27th W1ADM, Hyannis, Mass., PAQASD from 12:20 to 1:10 a.m., E.S.T., using voice entirely on 3.9 mc. . . PAQASD was using c.w. and voice. . . W1ADM reports ASD's frequency as 3770 kc. . . and PAQASD is looking for W's every Saturday night from midnight until 3:00 a.m., E.S.T. . . W1ADM worked G5VL on February 13th, using voice entirely both ways. . . W1EF has now worked G5VL several times, and also worked PAQSLB on February 28th; PAQSLB's frequency is 3740 kc. . . Others known to have worked "across" on 3.9-mc. 'phone are W1BCP and W2FLO. . . VE5JB worked VE1EI on 3.9-mc. 'phone in early 1933. . . this is very unusual performance. W9BBU and W1BES.

The following stations were heard by W2DJY while aboard the S.S. *President Garfield*, from Shanghai to Singapore:

(3.9-mc. 'phone)

ve1ei ve4nc ve5er w1bes w1cwh w1dr w2au w2coj w2edw w2goq w3blz w3dq w3ary w4pw

(14-mc. 'phone)

em2ri em6xs hi6f hi7g ti2ro ti3at ve4hm vp5po w1bie w2awt w2eqv w2ezo w2exn w2fd w2goq w2hsf w2nb w2tp w2zc w3asz w3axt w3hnp w3hrx w3crg w3dmr w3md w5un w5yw w6cif w9aeq w9bmf w9def w9kfa xlg xlp xiu

## QRZ

W6HG, Los Angeles, calls attention to the misuse of QRZ. QRZ is not interchangeable with CQ! QRZ means, "You are being called hy. . ." QRZ? means, "By whom am I being called?" QRZ is intended to be used to inform an operator that he is being called by a particular station, and is usually used in answer to the query "QRZ?". QRZ? is used by many amateurs upon signing off with a station as an inquiry as to "who else is calling." Such use is okay hut QRZ is not interchangeable with CQ! Use it correctly, gang!

Rip Van Winkle has nothing on H. E. Leigh, W9MOF, Denver, Colo. When Jack Binns sent his first SOS back between 1907 and 1910, W9MOF started in radio and built three sparks sets. He had to give two of them away so that he would have some one to talk to! (How times have changed!!) Becoming discouraged with such a scarcity of stations he gave up radio and took up Morse, working for several railroads, W. U. and Postal. In 1913 he gave up telegraphy and (page Rip) never thought of it again until February, 1933, when he walked into W9BJN's station. The bug hit him, he brushed up on the code, took the exam, and went on the air in April of the same year.

You've heard of "heing asleep at the switch," hut have you heard this one?—VE3ZR of Seaforth, Ontario, was QSO a ham in Chicago. Everything was going smoothly when suddenly the OM at VE3ZR sounded rather muffled and for several minutes the Chicago operator could make nothing of the series of irrelevant sentences. Then came a sudden noise as something hit the mike . . . the operator once more became normal, and the truth was learned: VE3ZR had fallen asleep while talking and three or four minutes elapsed before he slumped down and hit the mike stand, waking up. During his "period of rest" he hadn't stopped talking! With a bit more practice he hopes to be able to get in more QSO's without losing any sleep!!

W3JO, R.M. Michigan, in charge of emergency equipment, keeps a regular schedule with W9PCU, Isle Royale, Mich., to provide communication for men isolated there for the winter. A five-hundred word report was recently handled. Amateur radio is Isle Royale's only means of communication.

## ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below: (The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in Hartford on or before noon of the dates specified. Due to resignations in the North Dakota and San Joaquin Valley Sections nominating petitions are hereby solicited for the office of Section Communications Manager in these sections and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, June 14, 1935.

Section	Closing Date	Present SCM	Present Term of Office Ends
Maritime*	June 14, 1935	A. M. Crowell	Jan. 18, 1935
Nevada	June 14, 1935	K. L. Ramsey	Aug. 15, 1934
Saskatchewan*	June 14, 1935	Wilfred Skafle	June 15, 1934
Alaska	June 14, 1935	Richard J. Fox	Feb. 16, 1934
No. Dakota	June 14, 1935	Fred J. Wells (resigned)	.....
San Joaquin Valley	June 14, 1935	Clyde C. Anderson (resigned)	.....
Md.-Del.-D. C.	July 1, 1935	Edgar L. Hudson	July 15, 1935
Arizona	July 1, 1935	Ernest Mendoza	July 15, 1935
Eastern Penna.	Aug. 1, 1935	Jack Wagenseller	Aug. 7, 1935
Washington	Aug. 1, 1935	Stanley Belliveau	Aug. 15, 1935
E. New York	Sept. 2, 1935	Robert E. Halght	Sept. 16, 1935
E. Mass.	Sept. 2, 1935	Joseph A. Mullen	Sept. 16, 1935
Ontario	Oct. 15, 1935	S. B. Trainer, Jr.	Oct. 18, 1935
Vermont	Oct. 15, 1935	Harry Page	Oct. 20, 1935
San Diego	Oct. 15, 1935	Harry A. Ambler	Oct. 20, 1935

\* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian General Manager, Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two year term of office is about to be held in each of these Sections in accordance with the provisions of By-Laws 5, 6, 7, and 8.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.

38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the . . . . . Section of the . . . . . Division hereby nominate . . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)

The candidates and five or more signers must be League members in good standing or the petition will be thrown out as invalid. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, hut no member shall sign more than one such petition.

4. Members are urged to take initiative immediately, filing petitions for the officials for each section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

—F. E. Handy, Communications Manager

## ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

Northern Texas	R. M. Cobb, W5BH	Apr. 15, 1935
New Hampshire	E. V. Byron, W1AJ	Apr. 15, 1935
East Bay	H. J. Burchfield, W6JTV	Apr. 15, 1935
New Mexico	J. M. Eldred, W5CGJ	Apr. 15, 1935
Rhode Island	C. C. Gordon, W1HRC	Apr. 15, 1935
Sacramento Valley	G. L. Woodington, W6DVE	Apr. 15, 1935

In the Western Florida Section of the Southeastern Division, Mr. Edward J. Collins, W4MS, and Mr. S. M. Douglas, Jr., W4ACB, were nominated. Mr. Collins received 11 votes and Mr. Douglas received 10 votes. Mr. Collins' term of office began March 21, 1935.

## O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in October QST (page 49): W2HHY, W5HWT, W9AND, W9OOO, W9PWU.

## Briefs

On December 25, 1934, VE5BR, VE4GA, VE3ZX and VE3NZ had a four-way QSO on 1.75-mc. 'phone. Power input at VE5BR was only 6 watts; using this power he has been reported QSA5 R5 on the east coast.

### Slovak Amateurs Organize

The Slovak amateurs in the United States have organized a club under the name "Slovak Amateur Radio Club." The purpose of this organization is to get the Slovak people acquainted with amateur radio and to get the Slovak boys interested in the art. The club at present is composed of the following: W2ASM, W2AUI, W2CJI, W2GGZ, W7CSE, W8ANY, W8IRY, W8IVJ, W8KBC, W8KXE, W8LJI, W9IZL, W9HPQ and W9RAA. All amateurs of Slovak nationality should get in touch with W9HPQ, who will furnish the necessary information on how to join the S.A.R.C.

Two Weyburn, Saskatchewan hams, VE4ES on 1.75 mc. and VE4OC on 28 mc., working 'phone duplex with VE4ES rebroadcasting VE4OC, took a local 14-mc. c.c. station, VE4UN, into the QSO by having his harmonic heterodyne the 28-mc. 'phone carrier. VE4KJ, 35 miles away listened to the three-way QSO, logged the 1.75-mc. c.c. 'phone on wave meter, set his P.P. T.N.T. to wave meter and broke the Weyburn gang with a c.w. heterodyne on VE4ES' 1752-ke. c.c. signal. He called twice, signed twice and heard the 28-mc. 'phone (VE4OC) QSP over VE4ES. If both 'phones use loudspeaker to mike, they have triplex operation, on three hands!

## Station Activities

### CENTRAL DIVISION

ILLINOIS—SCM, Fred J. Hinds, W9WR—RM's: ILH, KJY, AND, SQY copped first prize in Illinois QSO party, with HKC and OXA next in line. JSL delivered a message from VE4VD to his folks in Chicago. Two crystals in one holder at DBO. An S.W.L. from Galesburg reports ROQ worked 44 states on 1.75-mc. 'phone. Our sympathy to NIU in the loss of his father. JVJ attends local Synton meetings. NN is skeptical about "high-total" stations. HQH's QST 1:30 a.m. broadcasts have been reported R7 in 48 states. LIV wishes Springfield gang would take care of their own women! A visit to Centralia by the R.I. resulted in the construction of several new monitors! Coming hamfests: June 16th—Rockford; June 23rd—Bloomington; June 30th—Starved Rock. Egyptian Club plans to cop the Field Day contest. April O.R.S. party had EQX and RAQ on their toes. HKC, KJY, and RMN work a three-way schedule nightly. Interior decoration of shack at TAY. CKC's work in National Guard forces him to give up schedules temporarily. Rebuilding at DOU for first time in three years. NGG is looking for a "non-come-down" antenna! QRP at SRC. ATS finally got the rig on 14-mc. 'phone after a lot of fooling around. BPU now has 33-country-DX as result of "a wow of a DX contest." EATAO was PCI's first QSO with the new rig. ILH is handling traffic in her usual efficient style. The O.M., ICN, is also right near the top. SQY is the "handsome hero" in his high school's senior play. DX contacts are falling off at COW. St. Louis gang is waiting for someone to prove merits of 56 mc.—no one is willing to start! SMD joined the Taylorville "Stagnation Club." Radio is the least discussed subject at the Taylorville Radio Club. KA adds four new countries for a total of 54. NHF is interested in duplex between 1.75 and 14 mc. SMB is new reporter. CHEM is new president of the CIRC. Crackle paint will soon adorn WC's transmitter. Report to the S.C.M. each month and get a copy of the scandal sheet "ILLINOISE."

Traffic: W9ILH 1592 KJY 927 ICN 428 SQY 391 DOU 265 (WLT 85) RMN 183 OXA 180 CGV 153 DBO 151 HPG 105 IEP 92 PCI 54 JVJ 52 NKC 51 NGG 47 HQH 43 DPD 41 FYZ 40 CKC 38 RAQ 36 KXD-KEH 32 NXG 31 NN 29 SRC 26 GSB 23 MCI-DDO 22 ERU 26 FO-PGB 14 FXZ 12 PJJ 11 PTW 10 PSP-ATS 9 OKZ 8 PTQ 7 NIU-

CUH 6 SKF-KXD-SOW-TAY 5 FTX-PLL-ANQ 4 JUBPU 3 RBR-LNI 2 AA-WR-CEO-JSL 1.

INDIANA—SCM, Arthur L. Braun, W9TE—TGC has new Jr. op. OPN moved to new QRA. RUA knows all about peaches. LLV is getting O.P.S. on 1.75 mc. lined up. TRN is preparing for O.P.S. DET has rig ready at new QRA for DX. JHQ is doing his part for A.A.R.S. NTP operates on 1.75-mc. 'phone regularly. NBZ has new RME9D. PSB likes high power. FIH moved and decided to increase power. MDT uses a '12A with fine results. SMA gave up radio for new V8. HUF is operating c.w. on 3.5 mc. ERP is getting hot on traffic. JRK leads state in traffic as per usual. HUV worked PY, HC, G for DX this month. IU worked FB8 and PK3 for DX. EDP built new shack. EGQ is ready for traffic. GFS is back on after a "breathing spell." MQV has separate rigs for 1.75 and 3.5 mc. LSZ reports via radio. HUO7 is QRL schedules. AXH is in Ozark Mountains for vacation. OEC is new O.P.S. MPR moved to new QRA and is building 56-mc. rig. OXM met the gang at Detroit World's Fair. PQL is winding coils for 14 and 7 mc. SVH keeps regular O.B.S. schedules. SNQ is ex-9AUC and is on at Portland. PIL is adding '03A to his rig. LKI has his hat in ring for O.P.S. AMM got new countries in DX contest. JOQ is planning new 'phone rig. BKJ is still going on 'phone after five years' planning. JTU spent 30 hours in DX contest. KPD is on 28 mc. regularly. PWZ is giving 1.75 mc. a try. JJA moved to Indpls. SWH is ex-8DLS. TMP is new at Kendallville. TUE is new at Ft. Wayne on 1.75-mc. 'phone. REW has new Jr. op. IBX worked K6 for DX this month. TE has his share of transmitter hugs. SDQ is giving 'phone a try on 1.75 mc. MQQ is DXing on 7 and 14 mc. SPB is on 3.5 mc. HTX is putting in Class B 'phone rig. JTY is building new rack and panel job. OKX likes Class B rig. LXQ is building new rig for 'phone and c.w. The R.I. visited Indpls and put the lid on bootleg stations. He worked a 56-mc. hootleg and went right to the house and "met" him. Ft. Wayne and Goshen clubs are both planning field days in near future.

Traffic: W9TGC 15 LLV-DET 1 JHQ 50 NTP 5 DEJ 18 ERP 135 JRK 800 (WLEH 70) HUV 2 IU 13 GFS 2 MQV 11 LSZ 27 HUO7 144 AXH 3 OXM 466 SVH 2.

KENTUCKY—SCM, G. W. Mossbarger, W9AUH—ARU is going commercial on his rig, now under construction; some of you chaps that write "rebuilding" on your reports, glance at his report total. FZV is taking a dive to 14 mc. for the summer. BWJ says too busy for April O.R.S. party, but look out in July! EDQ lost antenna in wind, but got on Ky. net with antenna six feet high and kept schedules. Atta O.R.S.! IFM likes Ky. net and proves it. SDC wants more Ky. parties. CDA, the pride of the S.C.M., sends in usual fine report. GUZ, back on air, QSO'd Africa and Europe first day. OMW is percentage man. OX has been fishing. IXN, P.A.M. for state, says to tell youse men he can copy code as well as bark into a mike. SFD is state champ rag-chewer, so his report cards indicate. SDG is Ky.'s youngest ham and reports regularly. RBV joined A.R.R.L. and is thinking about O.R.S. appointment. BAZ visited Hartford, Siam, New York, Peoria and way points; says he saw everything and everyone. ERH has new YL op. PAZ reports nil. HAX has 100% schedules and likes Ky. net. FGK is too busy with tractor and plow for O.R.S. work. AYH has heard card from London on his 14-mc. 'phone. MN, new O.R.S. king, is making big plans to have his call on cup second time. ELL should have the snow painted by now. HBQ is rapidly becoming candidate for Nobel Prize; he has more jobs than Andy Mellon. I had the pleasure of observing several of our wildest and most rabid 'phone hams in action in their home halliwick and, FZL, EI, TKP, SXP, NGZ, I will be seieu' you on "75."

Traffic: W9HAX 81 BAZ 47 RBV-SDG-SFD 2 IXN 27 OX 93 OMW 56 CDA 104 SDC 23 IFM 24 EDQ 49 BWJ 12 FZV 4 ARU 122 ELL 3 MN 6 HBQ 124.

MICHIGAN—SCM, Kenneth F. Conroy, W8DYH—Ahem! Mrs. DYH presented your S.C.M. with a nine-pound, two-ounce baby girl, Patsy Anne, Easter Sunday morning—send congrats—and earmuffs—by radiol Barney Fitzgerald, the original police radio operator (now retired), is all set with 8FWU at Lenox, Mich. ERX and DWB hit B.P.L. for first time. DVC, East Mich. R.M., knocks off

B.P.L. again. FB! D.A.R.A. station, NLG, is in again. ICM, who wants to trade transmitter for engagement ring, just misses B.P.L. FTW, Det. R.M., got new car and wants a YL—line forms to right! QT, A.A.R.S. Liaison R.M., says that KYS thinks he has s.s. super 'cause only sig he can hear is his own! LSF pounds out his totals via Trunk Line "A." BMZ must have gotten that summer-cottage-widow, because he has nix to say this time. DPE has the C.C.C. net coming along very FB and is working with BRS on C.W.C. trunk lines. LYS says that schedules help ewell his total. Swell. IBH knocked off his total in A.A.R.S. ZAG contest. GHA is at C.C.C. camp. Harrison handles most his on 1.75 mc. EGI and HHQ are running down bootleg call WECP—in north part of Jackson. IOR, papa of eleven (football team?), had to move to larger quarters! DED made 3736 points in YK/W contest last fall. DSQ has new crystal rig. Reports from Gratiot County Radio Club, via LLW, show that DQJ is disgusted with 'phone—been trying to book a YL—but they just don't seem to come back to him! KLR is going to build that super this time or else—. Ludington Amateur Radio Club plans a big ham-party get-together this summer. Details later. MTE is back from Army—uses three bands. LWC, our latest O.R.S., would like to hear from O.R.C. men in Michigan. ARR, U.S.N.R. Liaison R.M., reports BPL's latest recruit. FCL has new job. KNP, Michigan's youngest O.R.S., will be on from KTF this summer. FTV plans c.c. Tri-tet. IFE reports many pro's and con'e to his anti-expansion of 'phone band circular. WA is having monthly meeting of 'phone enthusiasts on Broadway, Detroit. MPT plans 14-mc. operation for summer. DZ reports nothing new—yet. FEE, O.P.S. and IKZ, P.A.M., are dodging the summer QRN, along with many other O.P.S. by using 56 mc. GQB is now in 2nd place in local DX race—DHC 1st. NQ is building his sailboat. ECX reports for first time. Keep it up, OM. CU is eating typhoid germs so he'll get eick and the gang will take pity and raise 70-foot mast for him! Apologies to AYO—we had it wrong last time, the wind only took his wire down—but since then the wind has been around and made us right—his 53' mast reposes on ground! LTH is rearranging so as to be able to shift to 3.5 mc. for some brass-pounding. MICHIGAN NINES: W9PDE, former Chief R.M. of U.P., has been chosen as Assistant S.C.M. for the U.P. We are sure that this arrangement will be for better of our organization and Joe will be a great help to all the Michigan Nines. Reports should be mailed direct to W8DYH as before. Everyone is all set for the big U.P. Convention to be held at Marquette, June 22nd-23rd. SQB lost a bet to TPP and had to write a "spring poem!" (see D.A.R.A. Bull.). OXE was heard in South Africa—on 3.5 mc.! EVI moved to same QRA as PDE. RHM has been appointed R.M. to take over the vacancy left by PDE. DDK says the P.P. ten's can't take it on 14 mc. C.C.R.A. had spark equipment on display at Mich. Tech. Show, May 10th. PCU leads the U.P. gang. CGP works 56 mc. and wonders who will be first to QSO Isle Royale on 56 mc.??? OZM reports that TQT is still his YL—EQV quit grinding crystals—wonder if he has hopes? TQT hurries home from school to keep echedule with hoy-friend OZM. HSQ is QRL work. First report from TTY Bros. CWR reports EMB back from hospital. CE has all equipment for 200-watt job and will be back when built. AAM reports via PDE.

Traffic: W9PCU 155 RHM 153 CGP 119 PDE 84 OZM 46 AAM 40 CWR 14 CE 10 TTY 8 EQV-SQB 6 OEX-TQT 5 HSQ 1. W8ERX 893 DVC 651 NIG 538 1CM 431 FTW 371 QT 344 LSF 208 BMZ 135 DPE 115 JKO 81 LYS 78 IBH 76 GHA 72 GUC 69 ARR 64 EGI 45 IOR 43 DED 32 LMX 40 BRS 27 DSQ 25 MTE 24 CFP 23 NR 28 KLR-LWC 17 DUR-FCL 16 KNP-KYS 14 GQY 12 AIJ 11 ABH-IFE 9 FX-MPT 8 DZ 7 FEE-FRW 4 GQB 3 LZV 2 DWB 561 FTV 19 ECX 1 NQ 2.

OHIO—SCM, Robert P. Irvine, W8CIO—This is the largest report received since I took office. Thanks, gang! The Ohio Grah Bag Parties are coming along fairly well, but there seems to be a lack of activity. It has been recommended by the most of the O.R.S. and O.P.S. to make it an open party for all "licensed" amateurs. These parties are held on the first Sunday of each month between 6:00 a.m. and midnight. The call will be QJ OGB, and all that is to be

done is contact someone in Ohio, exchange a message, count 3 points for it and send in your score to the S.C.M. A prize of some kind will be donated by someone of the gang for each party and you won't know what it is until you get it. So let's go, fellows, and let the rest of the country know Ohio is still on ye map. RN is now operating KENN. IET is new R.M. UW is busy with A.A.R.S. ISK says watch his traffic total. LGL handled "Hobby Show Traffic." MQO has new ACR136 receiver. HMH is operating on T.L. "B." LZK is building new transmitter. WE has new location. INT is working some on 14 mc. GUL is going into portable work soon. GSE is now A.A.R.S. AQ is going to work 56 mc. during the summer. BKM is having trouble getting RK-20 to work. ITR has only A.A.R.S. schedules. BMX will be O.R.S. soon. JFZ is having trouble matching his working hours and echedule time. LVV attended Midwest Hamfest and blew three tires getting there and back. LZE has rebuilt transmitter. BKE is going 'phone soon. CTP is new A.A.R.S. LVU says PO is now on 1.75-mc. 'phone. KIM is new O.R.S. CWR, old-timer, reports for first time in ten years; ex-City Mgr., Spark 8A1B, "RB." MQC wants 211 tube. BYF handled all traffic on 1.75-mc. 'phone. MMF is rebuilding. EEZ says INX thought he was arrested when FFK left his card on his new machine. NHK is new reporter. FGC now has Class "A" license. KLP says Hamfest at Liverpool, April 27th. MOH is new reporter. W8HBQ will be on 1.75-mc. 'phone soon. W8JOU says too much YL trouble. HUR says new club at Bridgeport. IAW will try for O.R.S. soon. Phone Report: KVD is using portable while house is being redecored. EDR is still on sick leave and interested in 28 mc. HMS has rig back on the air, but is too busy at work to use it. JFC reports new ham, NMF, in Cbeviot. GDC is busy campaigning for 7-mc. 'phone frequencies. ESN reports offers of the "Lotus City Radiophone Ass'n"; pres., DN; sec'y, ANW; treas., GJS.

Traffic: W8CIO 696 (WLHC 28) RN 628 IET 364 HCS 285 FGA 212 UW 191 (WLHI 214) ISK 187 DVL 163 EME 145 BBH 115 (WLHA 276) LGL 114 GSO 79 LCY 78 MQO 72 HMH 60 LZK 46 WE 44 INT 34 GUL 32 GSE 31 HGE-KFQ 28 AQ 27 BKM 24 ITR 23 BMX 22 JFZ 20 LVV 14 LZE 13 BKE 12 CTP 11 LVU-DAT-KIM 9 CWR 8 KEV 7 MQC 6 BYF 4 MMF-EEZ-LAU 3.

WISCONSIN—SCM, Harold H. Kurth, W9FSS—IQW has done no more rebuilding since A.A.R.S. Net Control appointment. ATO received a very nice write-up in the Milwaukee Journal of April 5th. AKT was appointed R.M. for Southeastern Wisconsin and is trying to help all Wisconsin hams obtain echedules. OKS handled traffic for Weather Bureau. SES is an up-and-coming traffic ham. SDK is keeping three echedules. OTL is building a 5-watt crystal transmitter for summer camp. RQM is adding more schedules to his list. DNU recently installed R.C.A. receiver. JCH is using two RK20's in final. RAK is rebuilding. HKJ has 125 watts input on one '10. CZY resides in Milwaukee and is active after many years' absence from the air. 9XAZ, 31.6 mc., is broadcasting a ham program each Saturday from 6 to 7 p.m. Milwaukee clubs are sponsoring the programs. Reports of reception are invited by 9XAZ (address the Milwaukee Journal Radio Department) and Charles Kaetel, 2851 N. 25th St., Milwaukee, Wis. LED bought a portable receiver for his automobile. PRM has a new crystal rig with a '10 final. FED plans a 'phone transmitter. CFT is back after a few years' absence from the air. LWX gave up 'phone because of the B.C.L.'s. HI. JRC is another ham (from Superior) attending the U. of W. The Wausau Radio Operators' Club will hold its Field Day on June 8th and 9th at Rib Mountain. All neighboring hams are invited to attend. Club news is invited for this column. Send reports on the 16th of each month. Address H. H. Kurth, 631 State St., Madison, Wis.

Traffic: W8HSK 233 IQW 184 ATO 150 AKT 77 OKS 59 SES 49 SDK 46 OTL 26 RQM 19 HDP 13 DNU 5 JCH 3.

#### MIDWEST DIVISION

IOWA—SCM, Phil D. Boardman, W9LEZ/WLUD—I 9ABE, 9CWW, 9HCH, 9HMM, 9LCX—R.M.'s. 9AED-P.A.M. The Campus Radio Club at Ames has about 15 members, and a new rig, which will burst the ether with an 860. The Tri-City Amateur Radio Club has decided not to hold its usual hamfest this year. The Clinton gang held



their yearly get together at the shack of 9JZM, with about 150 hams from these parts assisting. A swell time was had by all. (That was the first hamfest your S.C.M. has missed in years, too.) LEZ, ACL and HAQ are experimenting on 56 mc. CWG likes 7 mc. DZW reports via radio. HCH is experimenting on crystal cutting. AWH dropped schedules due to work. NNM and BUZ are working on grid-bias modulation. RCR enlisted in C.C.C. CYL is rebuilding into steel rack. NDN is developing h.f. equipment. DEA is a busy man. PAH is starting on new rig. TAW is ex-8BFQ. NZW received Class "A" ticket. FYC and FLK are building 56-mc. transceivers. PIR is high school principal. AED is still rebuilding. TNX and SKM are ducking QRN on 56 mc. SQK applies for O.R.S. DTI is on the air with an 880 final. SQL has a radio shop. HMQ is working in Chicago.

Traffic: W9LEZ 532 (WLUD 6) ACL 155 CWG 72 DZW 67 HCH 64 AWH 37 NNM 36 RCR 18 CYL 12 NDN 10 DEA 6 PAH-TAW-NZW 4 FYC 1 PIR 3.

KANSAS—SCM, O. J. Spetter, W9FLG—9KG and 9IOI—R.M.'s. We are very anxious to have a P.A.M. There are some excellent 'phone stations in the state; surely someone is eligible. Wichita Hamfest was a great success with a very large turn-out. Congrats, gang, on a real bang-up hamfest. Club secretaries are still letting me down on club activities. Come across, fellows, don't be so tight. MUY reports five hams in the Sigma Phi Epsilon House at K. U. BYV says dust storms busted up schedules. RIZ lost three '10's and got on with the Tri-tet osc. RQE is ready for schedules again. IQI bought out MKR, lock, stock and barrel. SIL is on 14 mc. now. IEL's rig is finished and he is keeping schedules again. We hear KG is on 14 mc. now, but getting ready for the big traffic again. FLG attended Wichita Hamfest, with KXB, in his new Ford. RQS is having receiver trouble. LFN is still at K.U.

Traffic: W9FLG 1080 IQI 604 IOL 263 AWP 242 IEL 229 RIZ 180 RQS 100 SIL 52 CMV 23 SJV 22 BYV 10 RQE 5 MUY 3.

MISSOURI—SCM, C. R. Cannady, W9EYG-JPT—RYD moved to Ferguson. JWI has YL QRM. MZD has nine schedules now in effect. SGP works five frequencies—four bands. CJR is now holding eight schedules. DIC broke crystal and is now using e.c. NNZ is running high DX fever. EYG moved to new home. KCG uses battery power supply. RPC reports good DX on 3.5 mc. LHQ holds Sunday schedules so YL can talk to "ole folks at home." JAP says 14-mc. FB for DX now. MLR rebuilt to rack and panel job. BTD is QRL college. OWQ is on consistently. PVV is QRL job and YL's. LVA is proud possessor of new FB7A. HUN was on the air three minutes during the month. AZL reports Jr. op cutting teeth. AWC is on 14 mc. DHN has one more semester of school. AUB, brother of KIK, is putting in wind power rig. JQS has tooth trouble, so RGV works 'em over and SVC rubs his tummy! LLW worked three G's with 10 watts in ant.—gets W.A.C.

Traffic: W9RYD 1330 (WLME 81) JWI 1226 MZD 590 SGP 393 AIJ 322 CJR 262 DIC 225 PYF 95 NNZ 63 EYG 28 FJV 33 (WLUT 24) KCG 51 RPC 30 JPT 24 LHQ 14 JAP-HUG 11 KEP-KIK-MLR 2.

NEBRASKA—SCM, Samuel C. Wallace, W9FAM—BNT heads the list as usual. KPA is to be complimented on the fine work he has done on Trunk Line "L" this season; he has worked very hard and under very adverse conditions, as the dirt storms out where he is have been terrible. FAM has been grinding away on Trunk Line "L" in conjunction with KPA and ION. DI's cooperation can never be forgotten. Thanks, Bill. POB is a new O.R.S. and has the qualifications and spirit we need in this ham game. EHW is another good old standby who needs no introduction as to his qualifications. RUJ is still doing his bit on both c.w. and 'phone. DMY is still holding the fort and enjoying a lot of FB QSO's along with some traffic work. KJP is trying to keep things moving in Omaha. FWW never gets tired of hamming; looks to me like he never sleeps from the number of schedules he keeps and the traffic he handles. HI, FB, OM! TBD is getting more and more interested in traffic work.

Traffic: W9BNT 2135 (WLU 327) KPA 1006 FAM 604 DI 475 POB 123 EHW 75 RUJ 51 DMY 38 BQR 10 KJP 6 FWW 642 TBD 7.

## DAKOTA DIVISION

NORTH DAKOTA—Acting SCM, Hartwell B. Burner, W9OEL-KBE and BTJ are QRL school. PGO is rebuilding to 830 final. FKY is looking for key click remedies. PRU blew three rectis, and learned the feel of 600—Hi. PJT has new 5-hand exciter, STJ a new R.C.A. receiver and KZL is proudly boasting Class A. FB, Wilfred. New calls reporting: TNT, TUY Fargo, SKQ Page, TFC Rolla, TUF Grand Forks and SZA Munich. DYA and HJC report A.A.R.S. nets work FB. Pioneer Radio Club was organized at Hope. Thanks, gang, for swell cooperation. GNS has new YL Jr. opr. STT keeps several schedules.

Traffic: W9OEL 301 HJC 105 (WLUI 137) KZL 210 DYA 206 PHH 78 DGS 84 STT 75 PJT 39 KBE 37 PRU 30 JAR 24 FKY 9 (Feb.-Mar. DGS 191).

SOUTH DAKOTA—SCM, Mike G. Strahan, W9PFI—OQV has been handling so much traffic lately that he had to get a mill. FOQ is working plenty of DX lately. PGV reports two new stations at Rapid City, TOP and UAU. Central S.D. has round-table QSO party on Sunday mornings. ALO is planning on working on 28 mc. all summer. IQD says that the Miller Club entertained eight members of the Huron Club at OED's home. Prizes were won by DGR, PHD, and DYM. FDD has 15 watts input to a 53. TY is still getting DX out of that single ten. Worked an FB this time. ARE and MRS. GRJ the only women hams in the state? SNX reports that the Pierre Club elected: PLF pres., LBU v.-pres. and SNX sec.-treas. LBU sold his old rig and is building a new one. GRJ, his wife, and IQZ paid a week-end visit to OED, KPQ, PGV, TY and SCB, the latter's ex-YL, by way of GRJ's new Chevy. That's one way to break in a new car. OXC will be on 14 mc. this summer. IQZ has built a new rack-and-panel job; he will also be on 14 mc. for the summer. SEB is preparing to go on with high power. Parasitic trouble overcame RWY, but he cured it. PFI is using break-in on his new rig, and it works FB. The following passed the examination at Sioux Falls on Sunday, April 28th, and will make up Unit 3 of Section 7, U.S.N.C.R., with James Fowley (9CRV) as Commander: GRY, CMJ, FDD, MBA, PFI, SOB and TJX.

Traffic: W9OQV 515 FOQ 30 PGV 27 ALO 18 IQD 11 PFI 10 FDD 4.

NORTHERN MINNESOTA—SCM, R. L. Rode, W9OMT—000 is appointed O.B.S. and O.P.S. BHQ, PLD and OML report via radio. KRH handled QRR traffic for Duluth and was at key for 17 hours. FB, Ed. DBF expects to be op. at C.C.C. Camp. JSN is getting out FB with three watts. RJF leaves for C.C.C. Camp. LSC visits FEP and IGZ. RGN uses batteries for power. HEO is using grid modulation on a pair of ten's. IGZ gets out FB with 15-foot antenna on a portable 1.75-mc. rig. OGZ is going strong in A.A.R.S. OPA is building 56-mc. rig. LAY is keeping schedule with 6GTM. JID is going on 3.9-mc. 'phone. AVZ is op. on banana boat in Gulf of Mexico and wants the gang to look for him on 14 and 7 mc. GPY has license renewed. RBA stands watch on 3.5 mc. every morning between 5 and 7 for Twin City traffic.

Traffic: W9JID 809 OGZ 81 RJF 276 OOO 17 OM1 7 JSN 5 OPA 3.

SOUTHERN MINNESOTA—SCM, Francis C. Kramer, W9DEI—9BKK, 9PDL, R.M.s. BN has a new ACR136 receiver. TQG uses a '10 TNT while crystal rig is out of order. PDL keeps schedules with Chicago and St. Paul. RHT has a new rig for 3.9- and 14-mc. 'phone. MOV has little time for radio. DVH has been treating plants with radio, and experimenting with photo cells. YC keeps several good schedules. CVA schedules his brother, AIQ of Austin, on 3.9-mc. 'phone. BXC blew a 3000-volt transformer. OGU is on 3.9-mc. 'phone. BTZ schedules his OW in Ariz. by 'phone from BXC. JBA has moved to a new QRA. BNN sends in the first report without traffic in 4½ years. Who will break that record? GLE has his little troubles with 14-mc. 'phone. MOW's mast came down in a sleet storm. MOV can't work Mpls. since city tore down old water tank. RKG has a 7-mc. crystal so is now going after DX. AIR is back on the river under the call WLEY: he reports the use of short waves for the river service this year. BTW had 104 foreign QSOs this month, and has now worked 55 countries. FMA sends 73 to the gang from Seattle. RAB



will be definitely on 14-mc. 'phone, if federal jury duty continues—what luck. ATD is anticipating the arrival of a Jr. op.; he is hoping for an OMI ADQ worked a VK, and ZL with 17 watts input. MMO has a new Class "A" ticket. RBW converted his breadboard rig to a rack and panel. RAU expects to grid modulate an '03A for 14-mc. work. DEI works plenty DX with 525 watts input to an '03A. Glad to have seen you at the "Mid American."

Traffic: W9BN/DEH 416 TQG 24 DEI 20 PDL 17 RHT 12 YC 17 DVH-MOV 6.

## NEW ENGLAND DIVISION

**C**ONNECTICUT—SCM, Frederick Ellis, Jr., W1CTI—GME regains his post as the high traffic station, with the C.B.A. traffic banner still banging on the wall of his shack. MK-WLMK will have a band switching arrangement for QSW 14 mc. from 7 mc. doubling in 860 etage. Business is good on Trunk "C" for DOW. Welcome to KV—hope to hear from you regularly every month. AMZ will be a way for the summer and had to cancel schedules. CVL-WLGI is QRL school but gets on for A.A.R.S. schedules. AMG is active in the Navy Net and busy on the farm and N. Y. N. H. & H. R. R. HYF paid a visit to GME; maybe he plans to eteal that traffic banner! DBU joined the O.R.S. gang April 5th. GKM is tied up with extra school work. AFB is very active on 3.5-mc. o.w. TD pushed some traffic around on 3600 kc. IRH sends in his first report. FSH was one of the operators at 99X located in Coco Solo, C. Z., in 1925. Remember him, gang? HTS wonders if the Northern Lights reported by VE2HH raised Cain with reception in East Hartford. BCG put in crystal on 3575 kc. Look out, Hall! INF, O.P.S., the A.R.R.L. Headquarters Operators' Club, operates alternate weeks on 14-mc. and 3.9-mc. 'phone and transmits official broadcasts at noon E.S.T. TS is busy rebuilding driver for final amplifier. IOV sends in his first report and applies for O.R.S. ISZ is active on 3.9-mc. 'phone from South Kent School. Members of C.B.A. took a trip through the Stamford Gas & Electric Company's plant and found out where and how their "juice" is made. CJD is doing a good job with Conn. bulletin, "Contact." It is free to each O.R.S. in the Section and brings the boys all the latest dope every month. All Conn. stations are urged to take part in the general QSO parties every Tuesday evening on 3.5-mc. band. Call "CQ CONN" or "CFNITE." Tune over the whole dial and see how many friendly contacts you enjoy.

Traffic: W1GME 537 MK 509 UE 328 (WLGG 51) DOW 300 KV 170 AMG 119 CVL 117 (WLGI 43) AMG 80 HYF 78 BDI 54 DBU 37 GKM 24 AFB 20 CTI 11 TD-IRH 9 NE-IOV 8 IKE 6 DLX 4 GTW-FSH-HTS-CTB 3 BCG 2 INF 1. W13JD 37 ES 17.

**EASTERN MASSACHUSETTS**—SCM, Joseph A. Mullen, W1ASI—ABG reports three stations active on 112 mc. locally. KH has 28-mc. c.o. rig going. WV's M.G. went west. AGA is QRL outside of radio. EVJ is busy building up O.R.S. list. BMW was heard in Eng. on 1.75 mc. RE is keeping schedules. FRO leads the Section traffic list again. GCL completed his first year as O.R.S. CRA is now in New York; sends 73 to gang. MD was laid up with German measles. IGN is handling lot of traffic and looking for O.R.S. Storm took off part of FNZ's shack roof. JL reports Maynard has new club forming. SW reports somebody using their call. HKY banded Byrd traffic. QW is looking for O.R.S. appointment. DBM is working portable in Sparks, Nev. DDE applied for O.R.S. DOF heard YN1OP on 1.75 mc. IPG uses P.P. '10's on 7 mc. HVR banded much of his traffic in A.A.R.S.

Traffic: W1ASI 27 ABG 37 KH 61 WV 30 AGA 6 EVJ 72 BMW 20 FRO 214 GCL 47 BEF 42 MD 1 IGN 189 FNZ 5 JL 32 SW 10 HKY 212 DBM 3 DDE 15 DOF 4 IPG 3 W1HVR 174.

**WESTERN MASSACHUSETTS**—SCM, Percy C. Noble, W1BVR—GZL handled 198 messages in 2 hours on 1.75 mc. A.A.R.S. 'phone net, and makes B.P.L. on deliveries. DVW is still knocking traffic for a loop. FNY is applying for O.R.S., and, with the traffic he's handling, he sure deserves it. DWO almost worked his first DX station—K6KNJ operating portable in Conn. Heh, heh. BVR is dividing his time among four "single-frequency" nets,

using his spare time for "general" operation. EOB is busy with A.A.R.S. and PG course at high school. DIE is swinging a nice bunch of schedules. ARH is busy on the 3732.5-ko. West. Mass. O.R.S. channel. IJR sends in a good report as new O.R.S. HNP handles daily schedules. HRV, another new O.R.S., is adding another power supply and buffer. ZB received Commercial ticket. FB. AWW is on the lookout for some good schedules. BNL is running some nice schedules. AJD is on the O.R.S. channel. DLD reports IQQ, an M.D., as new ham in Uxbridge. DDK is editor of "Xtal Control," a new bulletin being published by the Worcester Radio Association. GJJ is spending most of his time on 14 mc. APL is building a 56-mc. M.O.P.A. GUO and IJV are going to give 56 mc. a whirl. The report in the April issue that ex-1HH is now 1FL is in error; ex-1HH is now W1FL; W1FL is still held by Don Messerv in Hudson, Mass.

Traffic: W1GZL 360 DVW 271 FNY 137 DWO 98 BVR 84 (WLGG 277) EOB 69 DIE 63 ARH 62 IJR 36 HNP 19 HRV-ZB 15 AWW 14 BNL 12 AJD 10 DLD-IJV 5 COI 3 DUS 2 DDK-GJJ 1.

**NEW HAMPSHIRE**—SCM, Robert V. Byron, W1AVJ—DMD, ET, and AVG are working DX on 14-mc. 'phone; DMD worked a G on 'phone. DMI is on Haywire Net with flea power of 8 watts. IDQ is going strong as ever. IJB is trying 1.75-mc. 'phone, also working on 56 mc. FCI reports new radio club in North Conway with 12 charter members called the Saco Valley Radio Club. FCI himself is QRL fishing. DUK is working DX on 14-mc. c.w. BCP pounds thru with his fine 'phone. EVW is in the Navy now. CUZ is building 1.75-mc. 'phone. GMM gets out fine. APK has new SW45 receiver and says it is fine. EAL is busy between A.A.R.S. and 56 mc. GHT and HQE are working on 56-mc. portable. HTO has RK20 working very FB. TA is back on the air again. Welcome back, OM, and let's hear from you. IGI is getting set for summer 56-mc. work. GDE and GEY are busy in A.A.R.S. IIV is on with 212D grid modulated, also doing 56-mc. work. IP is looking for traffic. IDY is putting 860 in final. UN is very busy man with traffic. FFL is looking for actives stations for Army Net; if interested, get in touch with him. FFZ is on regularly. ILK reports new operator, which makes five there now. DNR is on all spare time looking for traffic. GOB moved to North Conway. GOC is going strong. HOU is working all bands. GKE has new PB7X. HOV is all wrapped up in Navy Net, and you should hear him drill. AVL is QRL the YL now DX contest is over. IOC is the 56-mc. artist in this Section. AP, TP, FGM and EUH are all busy in Army Net. ERQ is pounding the traffic out FB. Any active and reliable stations interested in an O.R.S. or O.P.S. appointment, get in touch with the S.C.M. Look at your certificates and see if they need endorsement, also would like more reports. I want to thank the members of the N. H. Section for their support in my appointment as S.C.M. and I will try and do my best. Do not hesitate to write me for any information you may need.

Traffic: W1ERQ 359 UN 150 DMD 99 FFL 67 (WLGB 48) FCI-GEY 40 IIV-GHT 38 GDE 33 IP 32 HTO 27 FFZ 25 EAL 16 DNR 8 GMM 12 GOC 6 IJB 3.

**RHODE ISLAND**—SCM, Clayton C. Gordon, W1HRC—GOG is DXing on 14 mc. after trading a Bottle for a "Bottle." BJA has daily schedules with BEF. GTS has Class "A" and is on 3.9-mc. 'phone. DDY has new Halli-crafter and is on 3.9-mc. 'phone. BLJ has new receiver plus YL in Vermont. INB on 3750 kc. is best prospect for traffic for Narragansett. FUB blows 802's trying to drive an 800 on 56 mc. IQF, elected vice-president of P.R.A., is going crystal control to uphold dignity of the office. CAB entertained 8BAH recently. BES worked Alaska first time achieving very musty ambition. EOF has taken a YF—congrats. AXS has sold out and gone job hunting in Boston. INM has new 3850-kc. crystal and wants O.B.S. appointment. HEN is back home from C.C.C. HRC is all a-twitter over eprig of heather asst him by G6RV. AFO is planning code classes on 56 mc. IEG has made remarkable progress with his fist since taking on S.C.S. in A.A.R.S. GTN reports A.A.R.S. growing FB and is ready to make several appointments. FZG is A.A.R.S.'s star op. ARK started something with mobile 56 mc. and all the boys are jumping in. HJB picked up bunch of them and directed them to his

shack for informal meeting. The R.I. 56-mc. bootleggers had a visit from the R.I. which caused a raid on EZW's stock of "How to Become an Amateur."

Traffic: W1GOG 83 BJA 33 HRC 13 RLJ 11 DDY 7 INB 4.

VERMONT—SCM, Harry Page, W1ATF—The Vermont QSO Party on March 31st was honored by eight participants, who completed the "rites" with gratifying reports. GNF and EFC tied for high score—which, of course, necessitates a duel at the hamfest. BD drew the low score—so he is completely out. Several Vt. stations were active during the party, but failed to report and are, therefore, commended to the mercy of the Vt. Wouf Hong committee viz., AVP, GAE, and EFC. To those who so enthusiastically requested a repetition of the party, we promise another event in September. New reporting stations are ELR (a well-known participant in A.R.R.L. contests), HLH (outstanding 'phone station in Burlington), and IQG who is a brand-new C.W. ham. AVP entertained the R.I. EFC is "DXing" on 'phone. GNF has mounted transmitter in Standard Relay Rack. GGT entertained the

measles, but company never interferes with Bob's schedules. DQK was visited by BJP. BJP is QRL preliminary preparations for hamfest. GAE shows marked progress in traffic work.

Traffic: W1DQK 61 GAE 43 BJP 25 ATF 21 EFC 13 GGT-APV 11 GNF 8.

MAINE—SCM, John W. Singleton, W1CDX—OR is now giving 'phone and 56 mc. a try. CDX is all set up again in his new home. HSE has joined A.A.R.S. and says it is FB; he has three good schedules. BWR has some good schedules and is in line for O.R.S. DHH has a new final stage using an '03A. GOJ is doing very fine job as O.R.S. BNC is active in his club and on the 3.5-mc. band. DHH has moved to 41 Summit St., Old Orchard. IDN is looking forward so plenty of portable mobile 56-mc. work this summer. EEEY says we need a new "Q" big which means, "I've just called ten CQ's. If you didn't hear them, send me a QSL to prove I'm getting out." ITA went on a trip to Washington, D. C. DRZ will have 56-mc. rig in motor boat this summer. CRP is still working and experimenting with ultra-high frequency.

## National Highlights

THE Kilocycle Club of Milwaukee, Wis., sponsors a one and one-half hour program through W9XAZ each Saturday night, starting at 6:00 p.m. C.S.T. W9XAZ, owned and operated by the *Milwaukee Journal*, operates on 31.6 mc. with 500 watts in the final. Reports from distant listeners are particularly desired. Latest advices from W2CC indicate that he has had 804 QSO's with VK5HG and 635 with W9APY/W9WR. Record? W2GOW reports a new and popular Sunday night feature on 56 and 1.75 mcs. . . the Moosemilk Hour, during which new equipment is tested . . . the M.M.H. goes on 56 mc. from 9:30 to 10:30 p.m., and on 1858 kc. from 10:30 p.m. to midnight. Stations in the group are W2EOA, W2FDA, W2FPW, W2HSI, W2CKO, W2AJB, W2AD, W2IHW, W3CZL, W2GCE, W2HCE, W2AZQ, W2HGB.

K5AF/WZAL at Alhbrook Field, Canal Zone, continues to push out the traffic . . . 226 reported for the current month. The Frankford Radio Club (Philadelphia) recently conducted an "over-the-air-get-together" on 7 mc. with 12 members participating. W3CQQ has worked 3400 stations in 13 countries in two and one-half years with 5 to 70 watts input. W3CXL/WLM resumed schedules with Byrd Expedition ships, *Jacob Rupert*, KJTY, April 8th, and *Bear of Oakland*, WHEW, April 12th. Daily schedules are maintained, considerable traffic being handled. W3ZX has maintained two-way 14-mc. 'phone schedule with LU6AP for the past two months. High-frequency work is progressing rapidly in the Western New York Section. Amateurs all over the country are making preparations for the A.R.R.L. Field Day in June; much advance interest indicates that this activity will be very enjoyable.

The Before Breakfast 'Phone Club in California recently held a hamfest at Palm Springs; about sixty were present; it was decided that all members should get crystals on the same frequency in order to avoid QRM and improve operation—3950 kc. is the new club "spot frequency." The East Bay Section has a new S.C.M. in the person of OM Burchfield, W6JTV. The San Francisco 56-mc. gang, headed by W6SG and W6IBQ, make regular Sunday trips to Mt. Tamalpais. Watch out, records! The second annual Arizona hamfest held in Phoenix attracted 160 hams, YL's and YF's. Out-of-state guests included Pacific Division Director W6AN, W6BMC, W6FGH, W6ILC, W9HJS and W8FPW/KDKA. The S.C.M., in a hospital a mile away, was in contact with the hamfest from beginning to end via 56-mc. 'phone, thanks to W6GZU and W6CKF. The Philippine Section reports continue to reach the states via radio, thereby saving considerable time; the report in this issue came via W6TM. San Diego operators are lining up schedules for handling traffic from the Fair to be held in that city. Cooperation of amateurs everywhere in handling this traffic will be appreciated.

The National O.R.S./O.P.S. Party, April 27th-28th, was decidedly "higger and hetter" than any previous week-end contact contest. W9IU scored 54,000 points, W5BMI

50,000, each working over 190 stations! 201 stations were worked at W9ELL for a score of 47,000. Practically all operators' scores ran correspondingly higher than in previous parties. You can't keep the O.R.S./O.P.S. gang down! The traffic-handling contest between Tennessee and Arkansas was topped by Arkansas. W5DAQ has organized a Mississippi Emergency Net for relief in time of floods, storms, etc. The Louisiana State Convention will be held in New Orleans, August 24th-25th—it is not too early to plan to attend. W4AEP is new Tennessee station on Trunk Line "B." W9PUJ, C. E. Maehr, 808 Graceland Ave., Des Plaines, Ill., is convalescing from a serious illness and would be glad to hear from any of the gang who will write to him.

All S.C.M.'s urge you not to let spring fever, YL's, fishing, swimming, etc., make you forget to report each month on the 16th VK3HM, VK3HL, VK3HQ are, respectively, Mother, Son, Daughter! W2CC has worked them forty-three times. Northern New Jersey's QSO Party went over in a big way, "CQ NNJ" being a very familiar call heard on the air. *The Washline*, published by R.M. W2DBQ in the interest of the A.A.R.S. and the N.Y.C.-L.I. Section, continues as an FB paper. W9OEL is Acting S.C.M. for North Dakota. Central South Dakota holds a round table QSO party each Sunday morning. W9KRH, Duluth, Minn., was at the key 17 hours handling QRR traffic.

Hams interested in picking up the Schenectady Amateur Radio Association's presentation of QST N.B.C. radio dramas should listen for W2XAF on 31.48 meters each Tuesday evening from 5:45 to 6:45 p.m. E.S.T. The sketches are preceded by five minutes of short-wave news. The Alabama 1.75-mc. Grapevine Net continues regular meetings every Wednesday and Sunday. A big hamfest was held at W4ASQ, Sanford, Fla., on May 5th. W4BGA has been appointed an assistant director for the Southeastern Division. R.M. W4ACB, Western Florida, is editor of the Suwanee Transmitting Association's bulletin. W4KB is giving his yearly hamfest about the last of June; Florida hams, get in touch with your S.C.M. for further details. W4BBV is Assistant S.C.M. for Georgia, CM8YB for Cuba. W4TL is new Georgia station on Trunk Line "D"—an appropriate call for a T.L. station! Traffic from many C.C.C. camps throughout the states is being handled by amateur radio, a real service.

What sounds like a record is reported by W1GZL, P.A.M. for Western Massachusetts—he handled 198 messages in two hours on 1.75-mc. A.A.R.S. 'Phone Net! W1FSH, Manchester, Conn., was one of the operators at 99X in Coco Solo, C. Z., in 1925—remember that call? The Connecticut Brasspounders Association's traffic hanner for the Connecticut station handling the most traffic each month is very effectively being held by W1GME. The 73 Radio Club, Wilton, Maine, is holding a progressive contest over a period of several months. The Eastern Massachusetts report states that "WIMD was laid up with the measles"—what? with a call like that? W1DDK is editor

(Continued on page 76)

# • I. A. R. U. NEWS •

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Union Schwelz Kurzwellen Amateure  
Wireless Institute of Australia

### Conducted by Clinton B. DeSoto

#### Officers:

A complete reorganization of the U.R.E. was effected at a special meeting held in Madrid on March 31st. A new slate of officers was elected, as follows:

President: D. Francisco Roldán, EA4AB.

Vice-President: D. Francisco Bellón, EA4AQ.

Secretary-Treasurer: D. Edmundo Mairiot, EA1AS.

Cashier: D. Jose M<sup>a</sup> Benito, EA4BN.

Traffic Manager: D. Jose Gutiérrez Corcuera, EA4AT.

Angel Uriarte, EA4AD, for the past two years president of the U.R.E., whose efforts have brought the organization to its present high standing, was forced to discontinue active participation in the society due to the pressure of private affairs.

-----  
The new Federal Executive of the Wireless Institute of Australia comprises the following:

Federal President: W. M. Moore, VK2HZ.

Federal Vice-President: J. Pinnell, VK2ZR.

Federal Secretary: H. W. S. Caldecott, VK2DA.

Federal Treasurer and Publicity Officer: C. Bischoff, VK2LZ.

Federal Traffic Manager: E. L. Colyer, VK2EL.

W.I.A. headquarters is now situated in Sydney, N.S.W., and the address is as follows: Box 2127 "L", G.P.O., Sydney.

#### Items:

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The official QSL Bureau of the P.Z.K. is in charge of the L.K.K., Bielowskiego 6, Lwów, Poland.

The British Colonial government has changed the prefix for British Honduras from VP4 to VP1. Too bad, but it probably won't be Zanzibar or Ellice Island if you work a VP1 from now on. Thanks, VP1JR and W1BCJ.

Lieut. Col. W. G. Hawthorne of the U. S. Marine Corps calls our attention to the fact that there are no members of the U. S. Marine Corps now on duty in the Republic of Haiti, and none operating amateur stations in that republic. The last marine was withdrawn from Haiti in August, 1934. The Marine Corps is therefore no longer a suitable address for QSL cards. Cards can be sent in care of HH1H, J. D. Poindexter, Pan American Airways, Port-au-Prince, Haiti.

Cards for the VP4 stations in Trinidad and Tobago can be sent to Frank A. Herbert, 29 Reid Lane, Belmont, Trinidad.

It seems we overlooked reporting it before, but on January 1, 1935, Chinese amateurs discarded the prefix AC, relic of the old I.A.R.U. intermediates, and are now all using XU.

With the change in the W.I.A.'s Federal Executive comes a corresponding change in the W.I.A. QSL Bureau. R. E. Jones, VK3RJ, resumes the post, the address being 23 Landale St., Box Hill, Victoria, Australia.

#### General:

-----  
ZL3GD will transmit test signals on 5 meters, using 100 cycle i.e.w. with a directional antenna, at the following hours: June 8th, 0545-0600, June 9th, 0615-0645, June 10th, 0700-0730, and June 11th, 0730-0830 G.T. . . . . Can we expect some international DX on 56 mc.? . . . . Reported heard in Europe on 1.7 mc. by

G5BI, in this department for March, was W1BQK . . . . It has since been established that W1DQK was the station actually heard . . . . Heard by Horace D. Simonsen, ZL241 on 3.5 mc.: D4BDR, HB9Y, D4BAR, G6RB, HB9AQ, K7EGS, ON4VO, HB9AL, FM8BG, FM8FS, and several hundred W's and VE's . . . . And we used to think of 7 mc. as a DX band! . . . . Most of these stations were reported QSA5 R6 . . . . Heard in Palestine on 4 mc. 'phone by M. Goldstein, ex-W2CFZ-ENX, were: W2AGA, W9MM, W3BQ, W1BES, W1BR, W8KIR, W2MO, W3BQ, W1AJZ, W4LU, W9AGF, W9AAM, W3EEY, W1ADM, W2FFY, PA0WV calling W and VE 'phones, W2LO, VE1EI, W2AGL, W3BMS, W2LS, W4CRS, and W4AAD . . . . Plus many more too weak to identify . . . . The address given sometime ago for ON4UF was incomplete; the correction: L. Richard, Chateau de Bueken, Velthem, par Westpelaer, Belgium . . . . We at I.A.R.U.-A.R.R.L. Hq. enjoyed a visit during April from H. Kinnear, VK3KN, president of the Victorian Division of the Wireless Institute of Australia . . . .



VP4TA, H. B. TRASLER, NO. 2 MESS, POINTE A PIERRE, TRINIDAD, AND VPSMK, CYRIL M. LYONS, 2-B NORTH ST., KINGSTON, JAMAICA, REPRESENTING THE EASTERN AND WESTERN SECTIONS OF THE BRITISH WEST INDIES

## Special:

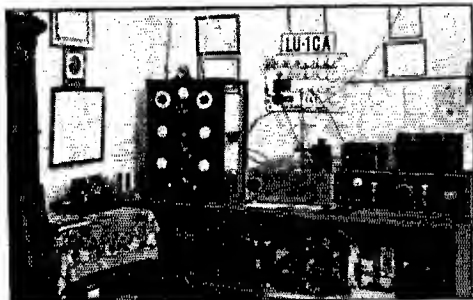
"CQ-NVIR," the official organ of the *Nederlandsche Vereniging voor Internationaal Radio-amateurisme*, in its present form is a relative newcomer among amateur periodicals, but that does not prevent it from being one of the most interesting and attractive. The March issue, the latest one on hand, contains 12 well-printed pages  $8\frac{1}{4} \times 10\frac{1}{2}$  in size, with covers of coated stock and a cover design that is truly one of the best things we have seen on any amateur sheet. This issue contains an editorial, much local news, a page devoted to the traffic department, another on the International DX Tests, a department for experimenters, and technical articles on a 56 mc. transceiver and a superheterodyne frequency converter in addition to miscellaneous general material.

"CQ-NVIR" is issued free of charge to members of the N.V.I.R. The annual membership fee is F. 5.50, at current rates of exchange about \$3.70. The publication office

address is Postbox 150, The Hague, Netherlands.

## VK-Contest Results

THE scores of the VK Contest were detached from the writeup in May *QST*. We are presenting them herewith. The next contest will be held in October.



LU1CA, MARCELINO REY, SAN EDUARDO 674, BUENOS AIRES, ARGENTINA, WITH 100 WATTS ON 14 MC

D4BMS attended the New England Division A.R.R.L. convention in Worcester during late April; someone told us a VK was present, as well, but we're not so sure . . . . Through the excellent cooperation of the L.C.R.A., operation of short wave broadcasting station HJ4AB, of Manizales, Colombia, on 7.14 mc. has been discontinued, and this station will henceforth be heard on the regular 6 mc. broadcast band . . . . Other internationally interfering stations will have changed frequency or cleared up technical inadequacies shortly. it is anticipated . . . .

### Australian Scores

VK3MR.....	100,320	VK4US.....	3624
VK3GQ.....	97,218	VK3HG.....	3572
VK3JQ.....	56,666	VK2BF.....	3400
VK4RB.....	53,097	VK7KV.....	3240
VK2LZ.....	48,488	VK3DM.....	3144
VK7RC.....	43,076	VK4UU.....	2933
VK3KX.....	43,010	VK3ML.....	2244
VK3HL.....	40,181	VK6FM.....	2160
VK4EI.....	37,980	VK3BW.....	2040
VK2ZC.....	32,004	VK2EL.....	1590
VK3HK.....	26,163	VK5MZ.....	1480
VK3JJ.....	23,809	VK5M.....	1463
VK2ER.....	17,157	VK2QN.....	1430
VK7JB.....	16,860	VK2RK.....	1233
VK2HY.....	15,050	VK3VW.....	1040
VK6SA.....	14,475	VK3PG.....	1020
VK2AE.....	13,660	VK2FX.....	1002
VK2EB.....	12,328	VK5HG.....	720
VK2OJ.....	11,074	VK3YO.....	720
VK5WJ.....	10,548	VK4RY.....	686
VK3BQ.....	10,222	VK2RG.....	648
VK2XC.....	9924	VK3UH.....	616
VK5WP.....	8720	VK3JO.....	525
VK2CS.....	8636	VK6CP.....	432
VK3RJ.....	8177	VK2BX.....	306
VK4GK.....	8095	VK2WH.....	276
VK5MY.....	7324	VK7CK.....	195
VK5RX.....	7243	VK2YT.....	172
VK6MN.....	5505	VK5RT.....	110
VK3XU.....	5320	VK3RX.....	75
VK3OX.....	5250	VK5WR.....	66
VK2KJ.....	5190	VK2FZ.....	51
VK2XV.....	3991	VK3LQ.....	5
VK2DR.....	3984		

(Continued on page 66)



# CORRESPONDENCE

The Publishers of QST assume no responsibility for statements made herein by correspondents

## False Rumors

204 East Ave., Olean, N. Y.

Editor, QST:

Just recently I have been hearing that the F.C.C. is going to take the 1715- to 2000-kc. band for commercial broadcasting. I have talked to several hams who have been informed of the same thing, also that the 160-meter 'phones are to be limited to 50 watts of power due to B.C.L. trouble.

Are these rumors true? It seems to me the commercial bands on which "the sun already never sets" should be satisfied! How true are these remarks to date? Are they groundless or otherwise?

—B. H. Ganoung, W8IYL

EDITOR'S NOTE: Such rumors are absolutely untrue, unfounded, and without basis in fact. It is true that other radio interests, particularly broadcasting, have cast longing eyes at this territory, and have even gone so far as to threaten an attempt to secure it, but the F.C.C. has displayed no sympathy with the idea, and we are assured will not entertain it under present conditions. The A.R.R.L. would resist such an attempt to the utter limit of its ability and there is no present possibility of its being made, either successfully or unsuccessfully. Neither is any power limitation contemplated nor would it be tolerated.

The current position: There are 57 channels between 1500 and 1715 kc. Of these, three (1530, 1550 and 1570) are assigned to experimental broadcasting, three to broadcast pickup stations. Marine fire, aviation, and motion picture stations each have one; geophysical stations have five and police eight. Many of these are double channels. There are three government and one general experimental channels. Twenty-two general communications channels complete the roster. Of all these services, the police are the most crowded. There is no likelihood of police encroachment on our band. Broadcasting remains the sole threat. With the recent opening up of the 1500-1600 kc. region, and the general licensing of new low power regional stations, broadcasting will neither want nor need new territory for some time to come—and then they'll probably look to the long waves.

## "Public Interest, Convenience or Necessity"

107 Ravenhurst Ave., Staten Island, N. Y.

Editor, QST:

If we hams lose any more privileges we can lay

the blame for it on our own deplorably indiscreet use of 'phone transmitters.

The other evening I visited a B.C.L. friend, who, knowing of my interest in radio, tuned in the ham bands on his all-wave receiver by way of entertainment. A few examples of the amateur activity we heard follows:

One chap attempting to sing, interspersing the ridiculous racket with profound announcements to the effect that this was W2 so-and-so testing. Another whistling, blowing the carbon granules until they screamed for mercy, and then announcing that it was all a test. Further on we heard a fellow thickly describing a drunken party at his home and trying to induce a neighboring ham to attend. Giddy ladies gushed dizzily into the microphone and generally made nuisances of themselves. Here and there we heard somebody hog-calling CQ endlessly and pleading for a QSO. Two others were lambasting the ether, apparently on full power, describing how much of each one's shack the other could see from his window, making dumb wisecracks and following them up with prop laughs so that the other would know the remark was meant to be funny.

My friend asked, "What do these fellows accomplish? I should think the air could be put to better use than that."

My reply was an apology and an evasion.

Now the point of all this is that all 'phone operators must realize that whenever the carrier goes on the air one is preparing to talk over the biggest party line in the world with from a dozen to some thousands of people listening to what they have to say. The advent of the all-wave receiver has increased the audience on the higher frequencies tremendously and these B.C.L.'s do not have the amateur interest that most of us have. If they happen to run across a ham transmitter during the course of tuning in a B.C. station, or until the novelty of the thing wears off, and hear only a lot of pointless and undignified chatter their estimate of amateur activities is bound to be pretty low. And when the F.C.C. or other regulatory bodies start cutting in on us hams they are bound to be indifferent, or perhaps even in favor of such a move.

Commercials may hog a multitude of frequencies and use them only for V transmissions in order to justify their license but Mr. John Q. Public doesn't know it so he doesn't care. He does, however, understand the 'phone stations he hears and he consciously or unconsciously forms

opinions about them according to the stuff he hears. So let's campaign for more businesslike operation of 'phone transmitters.

In case anybody thinks I am over-critical or crabby, I would suggest that he try leaving off the power switch for just one hour some evening, make believe he is a B.C.L. and try listening in for ham QSO's with that viewpoint. At the end of the hour let him try to enumerate the communications that from a disinterested listener's point of view were justified and he'll find the percentage pretty darn small. The ether is no place for mumbling immature chit-chat or for going on oral drunks. To continue it means certain loss of the remaining privileges and unless 'phone operation improves there is no chance for us to induce the "powers that be" that we ought to have more rights or fewer restrictions.

—Charles A. Younger

## Sick Rigs

184 Broadway Ave., Toronto, Ontario, Can.

Editor, QST:

If you feel run down, sick or out of sorts, what do you do? I know what I would do. A complete examination by a doctor would be in order.

Most of us when rebuilding our transmitters secure our information from radio magazines, etc. We relieve our information to be suitable to our purpose. How many of us really know the facts?

Like most amateurs I built a transmitter from circuits here and there, taking as I believed the best features to serve my purpose. The transmitter in question consisted of a 59 Tri-tet oscillator, xtal frequency on 80 meters, the oscillator doubling in the plate circuit to 40 meters, condenser coupled to a 46 huffer and condenser coupled to an 830.

Now the story is this. After building this rig I placed it on the air for about two months and thought the transmitter was working perfectly.

A short time ago a friend dropped in to see me and, of course the conversation drifted to radio. During the conversation the subject of coupling condensers between stages was discussed; the outcome was the coupling condenser between the 46 and 830 stage was discarded and other values tried with the result that in each case the huffer was overloaded. It was practically impossible to get a proper match between stages in my case. Link coupling from the buffer to the amplifier was tried. Changes were made in the circuit to allow for this. The results were much better; the huffer was not overloaded; the bias on the 830 was measured under load and had to be adjusted to 180 volts. The result was gratifying. Grid current showed the maximum on the 830 with no load (18 ma. d.c. max. for 830).

When loaded the grid current dropped to 10 ma. The excitation to the amplifier was more than you could wish for. The huffer stage was now under control (50 ma. at 400 volts) and was properly loaded to the amplifier. Measuring plate voltage under load on the 830 showed 725 volts at 110 ma. and grid current at 10 ma.

I believe the circuit is now working at the tube manufacturer's specifications. At any rate, signals into California have been received RST459 and 559 in nearly every case. Communication with the west coast was something new for this gear, and especially putting signals there nearly every evening for a week.

Now this experience may not be new to a lot of you fellows, but the point I learned was not to expect the most out of every transmitter you build, especially not until you are sure you are employing the best methods in your lineup.

—Art Vivian, VE3YX

## Good Stunt

204 Garber St., Hollidaysburg, Penna.

Editor, QST:

Flash! Flash!

Amateur Radio on the screen at last!

I am the projectionist in the local theatre and just pro-

jected Universal Newsreel No. 335 which contains pictures of sleet storm in Duluth, Minn., and scene of an amateur station with the spoken words "Amateur Radio was the only means of communication," or words to that effect. But tell those bams who may be photographed in the future not to bide their station call behind the curtain at the window.

Good stunt, I think.

—G. G. Reed, W8MSZ

## Good!

First National-Soo Line Bldg., Minneapolis, Minn.  
Editor, QST:

Your April issue is a fit companion for the March issue. Both are good. In fact, the impression here was that the March issue was the best in at least two years.

The "Correspondence" columns are perking up some. I think this is a good idea. Reading over a 1916 QST (Jan. or Feb.) the other day, I found that the publishers (Maxim and Tuska) said one of the principal objects of the sheet was "to enable radio amateurs to keep in touch with one another."

That has been lost sight of in the past; and it seems a damned shame. Go ahead and publish the letters you get—the "damfool" type as well as the others. Let the members see what you may yourself consider to be a "crazy" letter once in a while. If your readers agree with your estimate, they will be quick enough to tell you so. Publish some of the answers. This will cure the worst cases, and give everyone a laugh, besides. . . .

—Sumner B. Young, W9HCC

## The Future

2804 Hillsboro St., Raleigh, N. C.

Editor, QST:

Please publish the following in QST. Thanks.

Imaginary Meeting of the Federal Communications  
Commission in the Year 1940

The Chairman: Gentlemen, we have before us to-day the request of the American Radio Relay League to assign all except 50 kilocycles in each of the 1.7-, 3.5-, 7- and 14-mc. bands for exclusive radio-telephone use, giving as their reason for this request that nine-tenths of the amateurs have abandoned the use of radiotelegraph and are using radio-telephone exclusively.

I believe you gentlemen are fully informed in this matter, as the Secretary of the A.R.R.L. has been in Washington for the past week, working for this change in amateur regulations. So the meeting is now open for discussion.

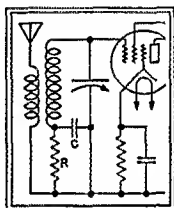
Commissioner A (After being recognized, speaks as follows): Mr. Chairman and Gentlemen. As you know, I was for many years an amateur and I have always championed the amateur cause.

Recently, however, I have had a change of heart. This change was brought about in a discussion of amateur radio with the honorable secretaries of the Army and the Navy.

These gentlemen admit the glorious history of the amateur in the development of radio and of their wonderful work in past emergencies but say that they no longer justify their existence, giving as their reason the rapid swing from radiotelegraphy to radiotelephone.

I argued that the construction and operating of radiotelephones had developed the amateur far beyond the point that radiotelegraphy ever could and for this reason they would be of much greater help in case of war or other emergency, citing the numerous occasions when the radiotelephone had been of aid during floods and storms.

Their answer was that radiotelegraph could in almost every case have done a better job, and that in war conditions were quite different, due to the deliberate interference by enemy radio. That under such conditions, except on the ultra-high frequencies for short distance work, the radiotelephone was quite useless and that radiotelegraphy was usable only by the highly trained code operator, capable of



LAST October we gave a warning on this page, to the effect that certain published schemes for improving FB-7 receivers were the bad news. At the same time, we promised to let you know if we ran across any good suggestions, and this month we are making good our promise.

The new scheme has to do with the method of connecting the preselector to the FB-7. The instructions supplied with the preselector describe how to make connections to the receiver so that the gain of both preselector and set is varied by the regular volume control. If, instead of doing this, the preselector is operated at full efficiency at all times, certain advantages appear; of these, the principal results of the change are improved signal-to-noise ratio and smoother control of volume.

The actual change is very simple to make. The instructions mention a red wire which is to be attached to the volume control, and a black wire which is to be grounded. To make the change, ground both of these wires. That's all that has to be done.

While on the subject of preselectors, an excellent article appeared in March *QST* describing how to convert an SW-3 into a two-stage preselector. Good dope.

When the HRO was first announced, it was described as having a neon light wired across the input terminals in such a way that an excessive voltage (as might be picked up during transmission) would trigger the tube and protect the receiver. However, we have since discovered a circuit arrangement that accomplishes the same purpose in a more effective manner, and consequently the neon light has never been used. We are going to describe this circuit briefly, because it is applicable to almost any receiver.

The whole trick is in the resistor, marked "R" in the diagram above. It increases the negative grid bias when strong signals are picked up and operates in much the same way as the grid resistor in an oscillator. What happens is this: Whenever an excessive signal is received, the grid of the first R.F. tube is driven positive and rectification occurs which causes a current to flow between grid and ground. The D.C. component of this current leaks to ground through "R". As "R" is a large resistance, this quickly builds up a large negative bias on the grid and limits the maximum possible grid current to a small value. It thus serves to protect the first tube and to limit the signal to the following tubes. When the transmission is over, the grid bias returns to normal almost instantly, and the set is ready for reception. The circuit of the HRO is more complicated than the simplified diagram above, as a network is provided which increases the negative bias on the 2nd R.F. and both IF tubes as well, thus reducing the noise in the speaker during transmission.

We cannot, of course, give a wiring diagram of changes that will fit all receivers, nor can we give circuit constants that are universally correct. Consequently, if you wish to use this circuit in your receiver, you will have to do your own engineering. Generally speaking, however, "R" should be  $\frac{1}{2}$  megohm or thereabouts, and "C" should be about .01 mfd.

Our story on this page last month about electric meters seems to have caused some surprise, inasmuch as we do not manufacture them. The fact is that we feel that anything that helps amateur radio will help us, and we are glad to use this space for any subject of interest to the amateur.

JAMES MILLEN





ANTENNA

**IMPROVE YOUR  
CIRCUIT  
with a  
TRIPLITT  
THERMO-COUPLE  
Instrument**

LEAD IN

**W**IDELY accepted as the most advanced meter for high frequency measurements, this Triplett instrument will improve your circuit. It is characterized by long-life design and high overload capacity.

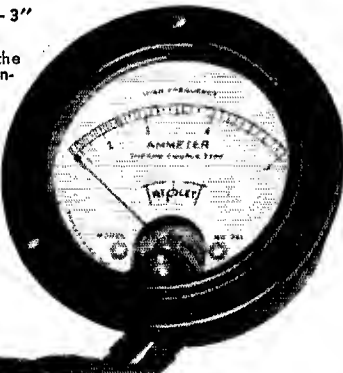
When the Triplett Thermo-Couple Ammeter is included in circuit, it may be placed on a panel at a distance from the antenna leadin. This precludes the possibility of upsetting the circuit, and permits placing meter on panel where it can be more conveniently read.

The thermo-couple is external to the meter, permitting the use of different ranges of couples with the same instrument and their replacement in the event of a burn-out. Triplett couples withstand a 50% overload and are connected to the instrument with 2' leads.

**Triplett Electrical Instrument Co.**  
157 Main Street      Bluffton, Ohio  
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Model

This is one of the many Triplett instruments, furnished in 2", 3", 4", 5", 6" and 8" sizes . . . and all popular ranges and types

See the Triplett Thermo-Couple Ammeter  
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distinguishing slight differences between the tone of the wanted signal and the interference.

They said that the technical training was of small importance, since a few experts could supervise the construction and maintenance of equipment, but stressed again and again the importance of good code operators and the years required to train them.

That the Army and Navy understood this need for good operators as far back as 1925 is proven by their establishing the N.C.R. and A.A.R.S. in an effort to train men for an emergency. The Army abandoned the A.A.R.S. two years ago and the Navy is about to do the same. This was because of the amateurs leaving code for 'phone and the impossibility of finding enough code men to justify the continuance of their efforts.

The amateurs have been warned time and again that their hobby was fast becoming just another hobby. That unless they looked into the future and provided means to justify their existence, they, like the faithful horse, would have to make way for more useful things.

The Army and Navy tried for fifteen years to make them see that the maintenance of rigid code requirements was necessary for the continued backing by the government of their demands for continuing the use of valuable space on the air.

They have ignored these warnings, until to-day amateur radio is simply a hobby, and they might just as well amuse themselves in some other manner. So Mr. Chairman, I move that this request of the American Radio Relay League be granted and at the same time they be notified that the United States Government, at the next international conference, will no longer oppose the efforts of the other governments and of the commercial interests, to abolish amateur radio.

—N. M. Patterson, W4BG

## Out of the Band

6197 McClellen Ave., Detroit, Mich.

Editor, QST:

. . . Why . . . must a fellow park himself outside the band unknowingly or otherwise and then proceed to QSO? A good instance of this occurred this evening, when the operator here was copying a ZLVA, being a member of the A.A.R.S. An out-of-band station, whose call I have on file, proceeded to park himself directly on WLM and QSO with someone or other.

As a consequence, part of the ZLVA was lost and had to be recopied on the next transmission. I'm asking you frankly, is there any vestige of an excuse for such a practice? QST and the A.R.R.L. have volumes filled with prevention and cure, which, summed up, mean exercising a little caution in checking frequency before hasting a CQ. . . .

—Art Hansen, W8MTE

## Discovered: QST

5207 N. E. Fifth Ave., Seattle, Wash.

Editor, QST:

For four years I've been looking at QST but I've only read the last two issues! I used to grab QST, look through it, and if nothing interested me, never give it a second thought, and silently cursed the magazine as kind of punk. But, having more time lately I began to read QST. Happy days! It's a magazine I never knew, and I read it from front to back.

—R. W. Jefferson, W7DSY

## Homemade Tubes?

South Range, Mich.

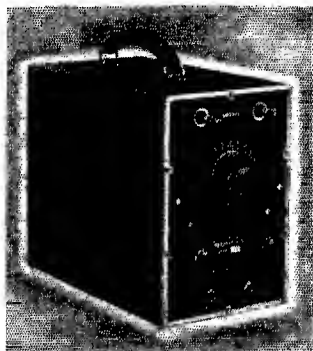
Editor, QST:

Say, gang, bow about making our own transmitting tubes? We get along FB constructing most all our ham equipment, but vacuum tubes seem to be the only exception. Why can't we make our own tubes?

. . . No doubt there are many in the amateur status who are in a position and familiar with the practical construction of vacuum tubes. . . .

—W9HLW, W9EUC, W9EXT, W9GYA, W9IOV,  
W9RIT, W9RJG, W9RCJ, W9TQT and W9TKE

# IF IT'S NEW WE HAVE IT!!



## THE NEW BARR DB3 CLASS B MODULATED 5 METER TRANSCEIVER

- ◆ Utilizes a Class B audio amplifier and modulator giving an output of 2.1 watts which is many times greater than that of ordinary transceivers.
- ◆ Can be operated as receiver, transmitter or both, in a car, plane, boat or while being carried for portable work.
- ◆ Working range anywhere between 2 and 100 miles depending upon the location.
- ◆ Compact convenient carrying size.
- ◆ 30 tube Audio Amplifier — 49 tube Super Regenerative Detector or Oscillator — 19 tube Class B Audio Amplifier or Modulator.

We were surprised at the marvelous value offered in this transceiver, just as you will be when you own one of them.

PRICE **\$16.20** less tubes, batteries & accessories. Bulletin on request.

### MATCHED SET OF SYLVANIA TUBES FOR DB3 TRANSCEIVER

One 30, one 19, one 49 ..... **\$1.56**

### DOUBLET TYPE TRANSCEIVER ANTENNA

Consists of two adjustable quarter wave rods with 12" insulating brackets. Length variable from 52" to 9 feet. Binding posts for feeders. **\$2.95**

### NEW UNIVERSAL TRANSCEIVER HANDSET

Single button mike, 2,000 ohm receiver. An all bakelite job ..... **\$3.54**

### HALF WAVE TYPE TRANSCEIVER ANTENNA

Composed of an adjustable half wave rod of aluminum, with insulated mountings. Adjustable from 38" to 9 feet. Binding post for feeder. **\$1.95**

### NEW KELLOGG TRANSCEIVER HANDSET

Single button mike, 2,000 ohm receiver. **\$6.60**  
(See May QST P. 122)

### AMERICAN S.B. HANDMIKE WITH SWITCH

**\$3.95**

### TRIMM PROFESSIONAL HEAD- PHONES

4,000 ohm ..... **\$2.25**

### BRUSH TYPE A WIDE RANGE CRYSTAL HEADPHONES

**\$7.20**

### HOYT ANTENNA METER

Hot wire antenna meters. 2 1/4" mounting hole, flange 3" diameter, supplied in 1 1/4, 3 and 5 ampere ranges. Why work without antenna meters when you can buy them at this special price? ..... **\$2.95**

### EIMAC UNSURPASSED TRANSMITTING TUBES!

Performance — Ruggedness — Power — Price

50-T Output 75 to 250 watts. .... **\$13.50**  
150-T Output 150 to 450 watts. .... **24.50**

### CASED FILAMENT TRANSFORMERS FOR EIMAC TUBES

Cased 5 volts CT 12 Amps. .... **\$2.95**  
Cased 5 volts CT 20 Amps. .... **5.95**

### NEW!! JOHNSON "HI-Q" TRANSMITTING INDUCTORS

20 Meters, 18 turns, 2 1/4" diameter, tune with 15 mmf condenser. .... **\$2.90**  
40 Meters, 23 turns, 3 1/4" diameter, tune with 25 mmf condenser. .... **\$3.60**  
80 Meters, 33 turns, 3 3/4" diameter, tune with 50 mmf condenser. .... **\$4.15**  
160 Meters, 46 turns, 4" diameter, tune with 100 mmf condenser. .... **\$5.55**  
(See May QST P. 97)

### OHMITE COIL CHANGING SWITCH FOR TRANSMITTERS

Single Gang. .... **\$1.80**

### THORDARSON OUTPUT TRANSFORMERS FOR TRANSCEIVERS

Pentode tube to low or high impedance phones. Open type, weight 9 ounces. Audio and Single Button Mike transformer same type and weight, each **\$ .99**

### RAYTHEON RK-31 CLASS B TUBE

**\$10.95**

(See May QST P. 15)

### WHILE THEY LAST ONLY FEW LEFT CASED FILTER CONDENSERS

**OIL IMMERSER** silver cased filter condensers with stand off insulators.  
Cap. DC Working Voltage Price  
2 mfd. 1000 **\$ .95**  
4 mfd. 1000 **\$1.65**  
1 mfd. 1500 **\$ .95**  
1 mfd. 2500 **\$1.95**

### GROSS CASED POWER TRANSFORMERS

650 v ea. side C.T. 350 ma. fila. 2-7 1/4 v C.T. and 1-5 v will give 500 v with choke input using 83 or 5Z3 tubes. You can run your entire R.F. and class B off this trans. .... **\$5.50**  
750 v ea. side C.T. 300 ma. fila. 2-7 1/4 v C.T. and 1-5 v. .... **\$5.65**  
750-1000 v ea. side of C.T. 300 watts, **\$6.65**  
850-1350-1500 v ea. side of C.T. 400 watts. .... **\$8.75**  
(the ideal job to give 750-1000-1250 v D.C. with choke input)  
850-1350-1500 v ea. side of C.T. 550 ma. .... **\$12.50**  
1500-2000 v. ea. side of C.T. 800 watts. **\$11.70**

### GROSS CASED INPUT SWINGING CHOKES

5/25 H, 200 MA, D.C. Res. 140 Ohms, **\$2.50**  
5/25 H, 300 MA, D.C. Res. 105 Ohms, **\$3.75**  
5/25 H, 500 MA, D.C. Res. 70 Ohms, **\$6.50**

### GROSS CASED SMOOTHING CHOKES

12 H, 200 MA, D.C. Res. 140 Ohms. .... **\$2.50**  
12 H, 300 MA, D.C. Res. 105 Ohms. .... **\$3.75**  
12 H, 500 MA, D.C. Res. 70 Ohms. .... **\$6.50**

### RELAY RACKS

Constructed of very heavy gauge steel (about 3/8" thick). Finished thruout in black Shrivel Lacquer — Complete with all panels. Panels 3/4" thick. Made in two sizes.

Type R7: — with 7 panels. 8 3/4" x 19". Overall size 2 1/4" wide, 66" high. Price. .... **\$14.75**

Type R4: — with 4 panels 8 3/4" x 19". Overall size 2 1/4" wide, 39" high. Price. .... **\$10.45**

### THORDARSON CASED TRANSFORMER

600 volts each side of C.T. 200 MA 2 1/4 V. 10 amps. C.T., 5 V. 3 amps. 7 1/4 V. 3 amps. C.T. .... **\$2.45**

THORD. CHOKE 12 H 250 MA., **\$1.95**

### NEW!! 866-A TUBES

10,000 volts Inverse Peak. Special **\$1.85**

### GENERAL ELECTRIC PYRANOLS

We have been appointed distributors of this famous commercial line of capacitors now for the first time available to the amateur.

	1000 V. D.C.	1500 V. D.C.	2000 V. D.C.
1 mfd. ....	<b>\$1.78</b>	<b>\$2.23</b>	<b>\$3.12</b>
2 mfd. ....	<b>2.67</b>	<b>3.71</b>	<b>4.75</b>
4 mfd. ....	<b>4.16</b>	<b>5.35</b>	<b>6.53</b>

20% DEPOSIT WITH ALL C. O. D. ORDERS REMIT BY M. O. INCLUDE POSTAGE Cable Address: GROSSINC

**GROSS RADIO, INC., 51 VESEY STREET, NEW YORK CITY**

(Continued from page 44)

## New RAYTHEON TUBES

### Additions to the RK Family

**RK-30**—A new low inter-electrode capacitance tube with plate and grid-leads out top of bulb. Molybdenum plate, thoriated tungsten filament. Plate supported free from stem.

FILAMENT, 2.5 V. 3.25 A.

OUTPUT, 50 W. at 1000 V. Plate, 65 W. at 1250 V. Plate.

OVERALL DIMENSIONS: 2 11/16" x 6 3/8"

AMATEUR NET PRICE . . . . . \$10.95

**RK-31**—Zero Bias Class B, modulator tube. Molybdenum plate, thoriated tungsten filament. Plate terminal cap at top of bulb.

FILAMENT, 2.5 V. 3.0 A.

OUTPUT at 1000 V. Plate 110 W. per pair with 13,600 ohm plate load.

OUTPUT at 1250 V. Plate 140 W. per pair with 12,000 ohm plate load.

OVERALL DIMENSIONS: 2 1/16" x 8 1/2"

AMATEUR NET PRICE . . . . . \$10.95

**RK-34**—Ultra high-frequency dual triode Isolantite base. Plate-leads out top of bulb. Uni potential cathode system.

HEATER, 6.3 V. 0.8 A.

OUTPUT at 400 V., 30 W.

AMATEUR NET PRICE . . . . . \$3.50

Ask your dealer or write to the nearest Raytheon office

**RAYTHEON PRODUCTION CORP.**

30 East 42nd Street, New York, N. Y.

55 Chapel St. 445 Lake Shore Dr. 555 Howard St.  
Newton, Mass. Chicago, Ill. San Francisco, Cal.

# RAYTHEON

TRADE MARK

## 4-PILLAR RADIO TUBES

about 200 feet from the highway, the line from the antenna to the shack being 175 feet long.

The "Q" drops the auto noise from the R8 to R9 level heard on the other antennas to a level so low that even with the gain wide open only an occasional car is heard very faintly. At the same time it gives a signal boost of about 6 db over the other antennas. When used on the transmitter the reports average one R better than when using a half- or full-wave Zepp.

On 40 meters a half-wave Zepp with three-quarter-wave feeders is used. This antenna and the "Q" are stretched end to end between the 75-foot poles. The other antennas are suspended between the poles and near-by trees.

Several odd and amusing incidents occurred during the International. For instance, there was the evening that the ZL's started rolling in with R8 signals on 20 meters; and, of eighteen logged, all but two had been contacted previously on 40 with due loss of sleep. Another, when OA4J and ZE1JB, both of whom were needed badly for new country credit, called CQ at the same time!

One disappointment of the tests was the fact that the Asians who usually are quite reliable did not come through at any time. DX conditions were not nearly so good at this QRA as they were during the several weeks preceding the contest.

Several new transmitters are under construction at present. These will be of one-k.w. input but the number of stages will be reduced to a crystal oscillator, a buffer-driver and the final. This is being done to facilitate fast frequency changes.

A great deal of experimental work is being done on antennas and construction of several directive arrays is planned during the summer.

### Technical Topics

(Continued from page 22)

Of course these rules are for transmitters that really are capable of 100 percent modulation without distortion. And they assume that the indicating meters have normal accuracy, unaffected by metal panels, adjacent chokes and transformers, etc.

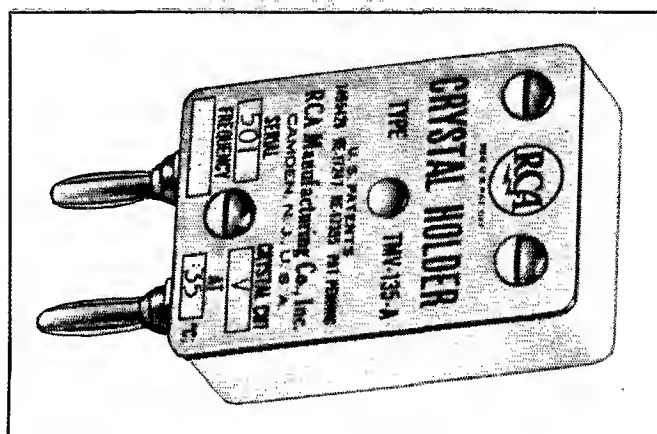
—J. J. L.

### Strays

There are meters iambic,  
There are meters trochaic,  
There are meters of musical tone,  
But the meter  
That's sweeter  
And neater,  
Completer  
Is the one with four amps showin'.  
Apologies to Sugar Beet.

—W9AFT

Type TMV-135-A. Amateurs' net prices, f.o.b. factory, V-cut Crystal and Holder, \$12.00; Holder alone, \$2.50



*Announcing the*

## NEW V-CUT CRYSTAL

to give a new degree of frequency stability to  
amateur stations

RCA is proud to introduce the new V-cut Crystal for amateur use. This entirely new cut, developed by RCA, has a temperature coefficient of only 2 cycles or less per million per degree centigrade at normal temperatures. V-cut Crystals therefore bring a new high degree of frequency stability to amateur stations. In addition to the remarkably low temperature coefficient, the new crystals possess the other outstanding advantages of high activity, ruggedness, freedom from spurious oscillations and frequency jumps, and a calibrated accuracy of 0.005%.

In order to make the fullest use of the V-cut Crystal's advantages, a special air-gap pressure-type ceramic crystal holder has been developed. This holder may be had separately, if desired, as it may be used to great advantage with other crystals.

RCA V-cut Crystals for the 3.5-to-4.0-megacycle band are now available, within plus or minus 5 kilocycles of the desired frequency, or choice from stock. See your authorized sales outlet for your requirements. A descriptive folder is available on request to:



### AMATEUR RADIO SECTION

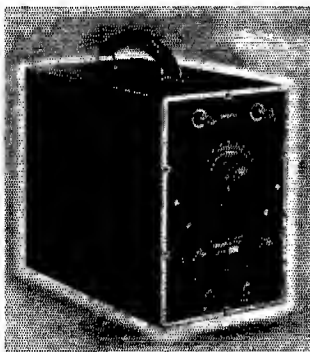
RCA VICTOR DIVISION

RCA Manufacturing Company, Inc.  
Camden , , , , New Jersey

# BARR

## • DB3 •

### Class B Modulated Transceiver



### AN OUTSTANDING VALUE

less tubes and batteries **\$27<sup>00</sup>** List Price  
40% discount to amateurs

The DB 3 utilizes a Class B Audio amplifier and modulator giving an output of 2.1 watts, which is many times greater than that of ordinary transceivers.

### SPECIFICATIONS

**CASE:** Size 11" long x 9 1/4" high x 6 1/4" wide, black wrinkle finish metal, heavy leather handle. All batteries are self-contained in case. Removable side panel for easy access to the batteries and tubes.

**PANEL:** Beautifully finished in black enamel with silver scales and lettering.

**CONTROLS, ETC.:** Two ceramic insulators are supplied for antenna, special large easy tuning knob, volume control on and off switch which acts as such in the receive position, and as a gain control in the transmit position, transmit and receive switch, microphone and headphone jacks.

**FREQUENCY:** Will cover 50mc to 60mc (amateur 5 meter band).

**BATTERY REQUIREMENTS:** Three 45-Volt B Batteries like Burgess 5308; two No. 6 dry cells, and one 7 1/2 Volt C battery.

**TUBES USED:** One type 30 — one type 19 — one type 49.

**SHIPPING WEIGHT:** 12 pounds.

### Order from your nearest distributor—

Air-Ola Co.	Huntington, W. Va.
Camradio	Pittsburgh, Pa.
Bond Radio Co.	Detroit, Mich.
Bushland Radio Service	Chippewa Falls, Wis.
Burstein-Applebee Co.	Kansas City, Mo.
Chicago Radio Apparatus Co.	Chicago, Ill.
Congress Radio & Battery Co.	New Haven, Conn.
Dymac Radio Co.	Buffalo, N. Y.
Gross Radio, Inc.	New York, N. Y.
Hatry & Young	Hartford, Conn.
Hall's	Harrisburg, Pa.
R. Kimball	Schenectady, N. Y.
Lamb Electric Co.	Santa Barbara, Calif.
Lee T. Pence Radio & Electric Co.	Redding, Calif.
Peterson Lumber & Paint Co.	El Paso, Tex.
Power City Radio Co.	Sioux Falls, S. D.
Radio Distributing Co.	Detroit, Mich.
Radio Distributing Co.	Harrisburg, Penna.
Radio Service Laboratory	Manchester, N. H.
Rissel Bros.	Detroit, Mich.
Russel Electric & Machine	Tucson, Ariz.
Saund Radio Specialties	Flint, Mich.
Sager Electrical Supply	Boston, Mass.
San Francisco Radio Exchange	San Francisco, Calif.
Sidies-Duda-Myers Co.	Omaha, Nebr.
Universal Radio Supply Co.	Louisville, Ky.
Watkins Radio Service	Ft. Pierce, Fla.
Wilcox Radio Sales	Chicago, Ill.

BULLETIN ON REQUEST

### BARR LABORATORIES

1476 BROADWAY

NEW YORK

### VK-Contest Results

(Continued from page 58)

W/VE

W1SZ	1509	ZS5Z	44
W1HU	546	ZU6P	34
W1DUK	80	144R	5400
W1GDU	80	D4BDR	1715
W1EFC	10	D4CAF	1362
W2AIW	1350	D4BIU	1265
W2BSR	1045	D4BUF	1030
W2DEW	900	D4BBK	195
W2FLO	330	D4BMJ	56
W2GSN	183	D4BER	56
W2CC	180	D4BEU	54
W2DVO	180	D4BHR	36
W2AFB	180	D4BKK	20
W2EUZ	180	D4BOG	18
W2FJG	40	D4CNF	10
W2ESZ	40	D4BLU	10
W3BES	3720	D4RGA	9
W3ANH	2226	D4BDF	9
W3CXG	1206	D4BMK	9
W3EVW	630	D4BJU	9
W3EB	324	D4BEH	9
W3APC	134	D4CIF	9
W3COP	126	CTIED	495
W4AJX	4884	EA1AE	280
W4BGG	675	E18B	705
W4AJY	432	E18F	120
W4CEN	195	F8RJ	240
W4DAC	106	F8CJ	159
W5UX	2730	F8EC	120
W5AFV	1380	F8VT	80
W5EHM	900	G2ZQ	3850
W5ASG	685	G6CJ	3400
W5BB	279	G0RB	2300
W5BCW	106	G1BL	115
W5CAS	128	G2OA	780
W6CXW	7854	G2YL	640
W6TI	2912	G6XQ	600
W6ANN	846	G2IO	400
W6JOE	336	G2WQ	300
W6KBD	186	G3ED	159
W6IWS	168	G6WY	210
W6WQ	14	G2BM	180
W6KFZ	8	G5OJ	60
W7DVI	1998	G8ZU	30
W7CHT	72	G2TB	20
W7GZ	5782	G4DS	20
W8BTI	5040	G2XC	10
W8DQN	2250	G5YG	2200
W8FGA	1980	G15NJ	198
W8DGP	1752	G16YW	40
W8DEB	146	H89AT	162
W8HJ	1050	H8J	18
W8QQQ	544	I1ER	20
W8KOL	420	J2GX	3414
W8AQ	400	J2JJ	2398
W8KVX	400	J3DP	1692
W8BDG	300	L43C	10
W8AAT	300	L7LJ	189
W8KC	162	MX2A	6
W8UV	100	OE1ER	480
W9TB	7104	OE8WB	40
W9FM	6000	OH3NP	504
W9LJ	3444	OK2OP	1446
W9ASV	2709	OK2W	180
W9AFN	945	ON4RX	680
W9MRW	770	ON4MY	120
W9FLH	710	PA0AZ	4908
W9JFB	525	PA0DC	1850
W9KA	504	PA0XF	452
W9WY	256	PA0YV	180
W9AIW	252	PA0JMW	80
W9BIB	138	PA0QL	36
W9NBM	36	PA0DA	10
W9LL	18	PA0XR	10
W9LW	9	PK3ST	2616
VE3B	2256	PK3LC	2130
VE3WA	264	PK1HD	1086
VE4IG	343	PK1VH	924
VE4RO	192	PK1CI	756
VE5HP	140	PK2KO	140
VE2HG	10	PK5RM	44

### Foreign

X1AM	392	SU1EC	3360
X1AIY	180	T12KF	36
X1A	210	VE4A	460
Z1JO	530	VSAB	8
Z1ZFR	912	VP3AM	8
Z1LDV	414	VQ4CRL	1785
Z13BY	380	V85AC	1464
Z1ZQM	39	V85AH	6586
Z1H	1446	V86G	5658
Z1GX	512	V87GJ	315
Z15R	188	VU2FY	2070
Z85U	96	VU2DF	116
Z86V	72	VU2LZ	18

Receiving Contest: (VK) VKFTH, Mr. F. T. Hine, 70,633; BERS 195, Mr. Trebilcock, 48,416; C. M. Howie, 8190. (OE) OE59, 950; (PA) PA.R 171, 2050; PA.R 242, 1950; (F) REF 2230, 120; (W) J. McCarley, 9; (G) BRS 250, 6150; BRS 1492, 4554; 2BWP, 3600; BRS 1213, 3500;



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## MALLORY

### REPLACEMENT VIBRATORS

**are available for Every Auto Radio  
and . . . *Get This!* . . . at no greater cost than  
ordinary vibrators!**

Mallory Vibrators are the standard. Over half the automotive radio sets in operation are equipped with vibrators made by Mallory. Mallory has led the way to better and more efficient auto radio performance—Mallory continues to pioneer each new development.

Now Mallory has Replacement Vibrators available for every set in every make and model.

As the vibrator is the unit in the auto radio set that naturally is subject to the most wear, vibrator service becomes increasingly important. Just as Mallory equipped auto radio sets give the finest performance, so Mallory Replacement Vibrators will give the greatest satisfaction.

Use Mallory Vibrators. Order from your jobber today.



Every Radio Service Man  
should be a member of the  
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in RADIO,  
AUTOMOTIVE AND

ELECTRICAL,  
INDUSTRIAL FIELD

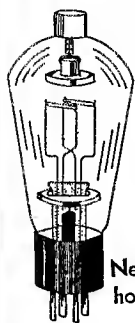
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**P. R. MALLORY & CO., Inc.  
INDIANAPOLIS INDIANA**

Say You Saw It in QST — It Identifies You and Helps QST

# Concentric Grid Oscillator 56 megacycle

Completely built ready to operate.  
Uses any type of triode—210,



245, 800, etc. Signals from a Concentric Grid transmitter can be received on a superhet. Completely built, less tube, \$12.45. Specify tube you intend to use.

New type 1000-hour 866

**\$1.65**

Our new  $2\frac{1}{2}$ –5–10 meter superhet is a grand success. It will open your eyes to what really satisfactory high frequency reception can be. All AC operated—very selective, band spread, dynamic speaker, a really extraordinary value, with tubes. If you can't come, write for the dope. **\$33.50**

For the high power gang—We can furnish a CW Xmitter for 20–40–80 m operation. A 1 kw job that can deliver an honest 1100W to the ant. Uses 2 Gammatrons. F.O.B. Newark.....**\$450**



**K & R 550V. 200 MA.  
POWER SUPPLY**

$2\frac{1}{2}$ V. @ 10A. —  $7\frac{1}{2}$ V. @ 5A  
TWO-SECTION FILTER

Uses 83 rectifier

EXCELLENT  
REGULATION **\$15.00**

## TRANSMITTER SERVICE OUR SPECIALTY

*Repairs and reconstruction at very  
reasonable prices*

### R.F. REACTORS

are the MODERN and PERFECT r.f. chokes

Type	RFR-1	RFR-2	RFR-3
Suggested Operating Band—mc.....	1.7— to 4	3.5 to 14.4	7.0 to 30
Inductance Value— $\mu$ h.....	170	70	30
DC Ohms.....	5.5	3.5	1.5
DC Current-amps.....	2	2	2
Price.....	\$1.05	\$ .90	\$ .75

**KALTMAN & ROMANDER**

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Newark, N. J.

BRS 1399, 360; BRS 822, 120. Germany. (d) DE 1836.R, 5202; DE 1857.J, 3768; DE 1818.I, 2950; DE 2220.I, 1830; DE 1729.U, 1800; DE 1555.D, 980; DE 2161.J, 944; DE 1943.H, 868; DE 1616.M, 820; DE 2194.V, 804; DE 2089.K, 540; DE 1872.U, 480; DE 2322.F, 456; DE 2192.P, 404; DE 2327.M, 296; DE 2454.V, 258; DE 2078.K, 351; DE 2409.F, 292; DE 1231.C, 232; DE 1971 C, 56.

### CONTEST NOTES

Some interesting statistics from logs: 210 stations sitting on the key at once would draw 35,973 watts of final amp. plate power! Of those 210 168 use CC, 22 prefer SE, and 20 MOPA. 130 of them chose Zepps, 51 S.W.F. Hertz, 7 Doublets, 12 end fed Hertz, 1 Marconi, 1 indoor, 1 600 footer and 1 260 ditto. Then again, 84 use TRF, 64 superhets, 38 det and audio, 22 det and 2 audio, 1 det and 3 audios and 1, ie, G6HP, likes just the one too. The average of the 210 chaps gave an input power of 171 watts per man, thanks to several kilowatt merchants from the U. S. A. I VK3MR worked 38 countries, VK3GQ 36, VK3JQ 29 and VK3EL 23. W9FM, "VK7RC and a few others put the m.a. needle (detector plate current) up to .6 millamp with each dot and dash." G2YL and W5VV hope the contest will be an annual one. XLA1Y worked with less than 3 watts input to his CC rig. VK3OC reported him R7/8 on occasions. MX2A was the only station heard from Manchoukuo.

## Complete 20-Watt 'Phone

(Continued from page 18)

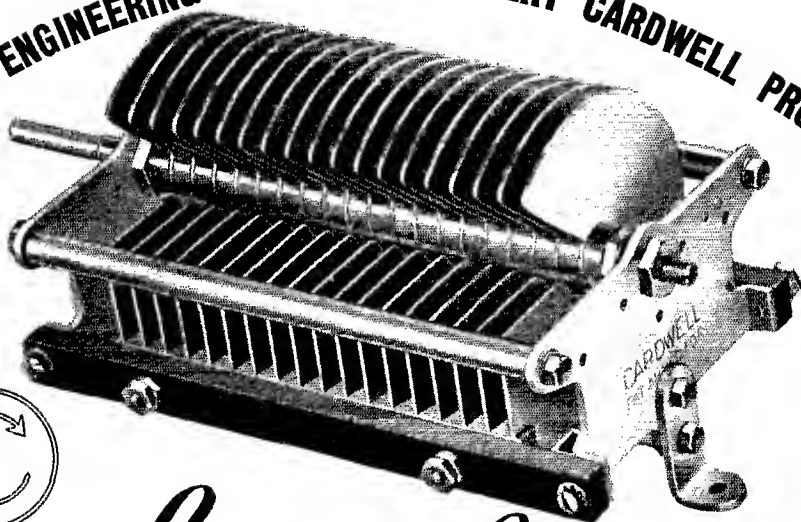
reliable. If the line voltage is 120 volts, it will be necessary to secure a drop of 113.7 volts across the resistor in the heater circuit. For a single Type RK-100 tube drawing 0.6 ampere, the series resistor will have a value of 189.7 ohms. In Fig. 1, resistor  $R_5$  passes the current for four tubes. It is only necessary, therefore, to divide the value for one tube (189.7 ohms) by four to secure the proper value for resistor  $R_5$ , which is 47.4 ohms. Similarly, in Fig. 2, resistor  $R_6$  passes the current for three Type RK-100 tubes, each drawing 0.6 ampere. It is necessary then, to divide 189.7 ohms by three, giving 66.6 ohms as the proper value of resistance. If the line voltage drops to 105 volts the value of the series resistor for a single tube is 164.7 ohms. Dividing this value by four for the number of tubes shown in Fig. 1 gives 41.2 ohms as the proper value of resistor  $R_5$  in Fig. 1. In the speech amplifier and modulator section shown in Fig. 2, the value of  $R_6$  for the three tubes shown will be 164.7 ohms divided by 3, or 54.9 ohms, for a 105-volt line.

At the present time it is necessary to operate the heaters of the RK-100 tubes in parallel. Series operation would be more economical of current but it is not to be used with the present tube construction.

It will be noted in each of the circuit diagrams that fuses are shown for the 110-volt d.c. supply and for the branch which supplies the effective cathode ionizing current. These fuses, which may be either 3- or 5-ampere types, can be the small automobile cartridge fuses or the standard screw-base type. It is essential that they be used for the protection of the transmitter. In this connection it is well to remember that where we operate a transmitter from a.c. with a conventional power supply containing rectifier tubes and filter components, the power supply itself has relatively



20 YEARS ENGINEERING SKILL BEHIND EVERY CARDWELL PRODUCT



# Leadership

*"It's An Old Story With Cardwell"...*

**1915** Cardwell designed, built and patented the original low loss condenser.

**1935** Twenty years of Cardwell acceptance is conclusive proof of continued condenser leadership for commercial and amateur high frequency transmission and reception.

**Send** for descriptive Cardwell 1935 catalog.

## ✓ CHECK THESE OUTSTANDING FEATURES

- ★ Original patented low loss condenser design
- ★ Rounded, buffed and polished plates
- ★ Adequate air gap to withstand high voltages
- ★ Sturdy mechanical structure
- ★ Radion or mycalex insulation
- ★ Grounded frame and rotor
- ★ Positive rotor contact
- ★ Ball thrust bearing
- ★ Panel or sub-panel mounting
- ★ Low dielectric losses
- ★ Single or split stator
- ★ Solid brass frame



THE ALLEN D. CARDWELL MFG. CORP'N.  
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Please mail me the Cardwell Catalog.

Name.....

Address.....

City.....State.....

# CARDWELL

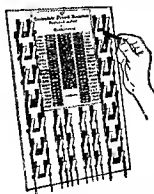
# CONDENSERS

Q6



No use doing a nose-dive under the service bench — or digging into a bunch of old cigarette tins for that umphy-ump ohm resistor . . . get this new **CENTRALAB HANDY RESISTOR RACK** that's **FREE** with an assortment of 40 **CENTRALAB RESISTORS**.

You'll like the way you can instantly "spot" just the resistor you're looking for . . . or tell just what resistance values are missing. See your jobber "right away pronto" or if you're from Missouri . . . mail the coupon for more information and a picture of what this **RACK** looks like.



## Free!

### CENTRALAB HANDY FIXED RESISTOR RACK

15 x 9½ inches . . . sturdy steel and includes an **R M A Color chart in FULL COLORS**. Assortment includes 20 — ½ watt type 316 and 20 — ¼ watt type 310 resistors in all the important values.

**NEW! Centralab Volume Control Guide**  
The new **CENTRALAB VOLUME CONTROL GUIDE** is now out . . . better than ever before . . . much new dope . . . and a special section on **SOUND PROJECTION CONTROLS** . . . suppressor information . . . circuits and graphs. Ask your jobber for a copy.

**Centralab** *Mail This Today*  
900 E. Keefe Ave., Milwaukee, Wis.  
Please send me information about your special deal which includes a **FREE HANDY FIXED RESISTOR RACK**.

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Address .....

City ..... State .....

My Jobber Is ..... **QST 6-35**

poor regulation. Consequently, in case of a short circuit the voltage output from the power supply drops to a very low level and usually nothing very serious happens. In this case, however, the transmitter and speech equipment is being operated directly from the light supply line with the whole power plant behind it—with an excellent possibility that the fuses in the main supply circuit are 30-ampere or larger size. And 30 amperes at 110 volts d.c. can do a very thorough job on any short-circuited transmitter.

#### OPERATING ADJUSTMENT

Jacks are inserted for measuring plate or grid current in the individual stages, only one meter being used for current measurements with meter connections to a plug of the standard type. The plate current to the crystal oscillator when loaded will be approximately 40 to 50 ma., the buffer double stage will run at 75 to 100 ma. and the final push-pull stage will draw between 200 and 300 ma. depending on the antenna load.

The procedure in placing the transmitter in operation is exactly like that used in the conventional transmitter. The cathode power in the tube must be started first in any case, which involves turning on not only the heater circuit but also the supply voltage to the effective cathodes or cathanodes. Initially the heaters should be lighted at least 15 minutes before any other voltage is applied—that is, when the **RK-100** tubes are first put into operation—in order to give the mercury a good "cooking." The writers followed this procedure and on operating the transmitter after this first time, the heaters were allowed to operate for approximately two minutes before any other voltage was applied. The second step is to apply voltage to the effective cathodes. In the transmitter described, this was done by throwing on the switch which is shown, in Fig. 1 and Fig. 2, next to the lamp used for dropping voltage. As soon as the effective cathodes receive positive voltage, the space between the cathanode and cathode in each tube will show ionization of the mercury vapor by the characteristic blue glow. The plate voltage can now be applied, placing the transmitter in operation. When receiving, the heaters are left on but it is desirable to turn off both the plate and effective cathode voltages, unless operation is duplex. It should not be necessary to cut off the effective cathode voltage during reception unless the line ripple is extremely bad.

The amateur's familiarity with mercury-vapor tubes might lead him to expect that these tubes would be extremely noisy to reception and productive of "hash." While this is true of mercury-vapor tubes when operated on alternating current for purposes of rectification, in the present instance direct current is used on the effective cathode circuit for ionization of the section between effective cathode and the cathode so that the ionization is constant. Under these conditions, there is absolutely no noise. It may be desirable at this point to bring out again the fact that the behavior of this tube is exactly like that of a conventional high-vacuum tube of very low

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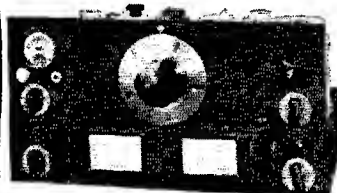
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<b>1.50</b>	3.5 mc	<b>1.00</b>
<b>1.25</b>	7.0 mc	<b>.80</b>
<b>1.00</b>	14.0 mc	<b>.70</b>

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LA-3	600 each side of center at 200 MA; 2 1/2V—10A; 7 1/2V—3A; 5V—3A. LA mtg. .... <b>5.00</b>
LA-4	800 each side of center at 150 MA; LA mtg. .... <b>5.00</b>
LA-5	800 each side of center at 250 MA; LA mtg. .... <b>5.50</b>
LEEDS SMOOTHING CHOKES	
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LA-30	12 Henry, 300 MA; D.C. resistance 105 ohms, LA mtg. .... <b>3.75</b>
LA-50	12 Henry, 500 MA; D.C. resistance 70 ohms, LA mtg. .... <b>6.50</b>
LEEDS INPUT SWINGING CHOKES	
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LA-60	5/25 Henry, 500 MA; D.C. resistance 70 ohms LA mtg. .... <b>6.50</b>
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LA-16	5 V.C.T. 20A; 7000 V. insulation LA mtg. .... <b>3.75</b>
LA-17	5 V.C.T. 20A; 10,000 V. insulation LA mtg. .... <b>5.00</b>
LB-12	2 1/2 V.C.T. 12A; 7000 V. insulation LB mtg. .... <b>2.25</b>
LB-13	7 1/2 V.C.T. 6 1/2A; 5000 V. insulation LB mtg. .... <b>2.25</b>
LB-14	10 V.C.T. 6 1/2A; 5000 V. insulation LB mtg. .... <b>2.50</b>
LB-15	5 V.C.T. 3A; 5 V.C.T. 3A; 5 V.C.T. 6A; 5000 V. insulation LB mtg. .... <b>2.50</b>



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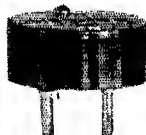
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plate resistance and that it is not at all related to the conventional grid-controlled rectifiers which are available for certain control purposes. Like the latter, however, it is affected by bulb temperature and might refuse to start in an unheated shack on a cold morning, if the mercury should not vaporize.

### RESULTS

The writers, like most other amateurs, were more interested in results than in the fine points of construction of the transmitter or in a discussion of the theory of operation of the tube. Accordingly, no time was wasted in getting it on the air at the QRA of W1GBE. Results were most gratifying with excellent QSO's being had with stations as far south as Miami, Fla., and throughout the middle-west. In each case, the station contacted was raised with the 110-volt transmitter and, following reports and some conversation with the small transmitter, the antenna was switched over to the permanent higher-power transmitter in the station. The comparisons showed the low-voltage job to be fully effective and the results were most gratifying, although there was really nothing new other than efficient low voltage operation.

### OTHER POSSIBILITIES

Experiences with the RK-100 in this transmitter indicate a number of interesting possibilities. For one thing, the writers expect to experiment with it in the crystal oscillator stage of both our "standard" transmitters with voltages as high as 300 or possibly 400 volts. It is apparent that the tube will deliver a very satisfactory power output as a triode crystal oscillator without developing sufficient voltage across the crystal to damage it or even heat it noticeably. To the man who has only 110-volts d.c. available, and who is experimentally inclined, the new tube offers a number of distinct advantages in addition to the opportunity to overcome voltage limitations. For instance, it was found, in experimenting, that the tube would oscillate freely on wave-lengths as short as 2 meters. Good output was obtained at this short wavelength despite the close spacing of the elements. While such spacing raises interelectrode capacities, electron transit time is reduced to a low value. This short transit time can be attributed both to the narrow spacing of the elements and to the fact that the electrons emerging from the ionized space, between the effective cathode and the heated cathode, pass through the effective cathode at fairly high velocity. There is also opened up to the man with the 110-volt d.c. line the possibility of developing a fair amount of driver output with line-voltage plate supply and with it driving a larger vacuum-tube stage, on which is the full capacity of a dynamotor or converter supply.

All in all, this new development will be of interest to a great many amateurs. The writers will be glad to help in any way possible if questions arise regarding the operation of the experimental transmitter described.

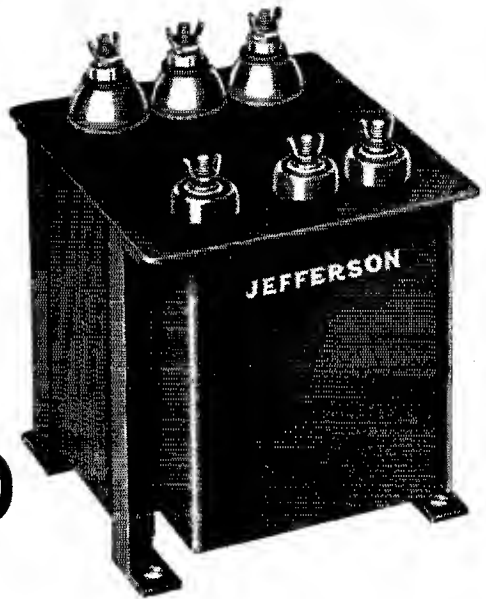
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D.C. rating — 1250 or 1000 volts at 280 MA through suitable filter. Voltage variation is obtained by means of primary tap.

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## The New 838

(Continued from page 27)

recommended is 3.2, primary to one-half secondary. Since this is the same ratio ordinarily used with 203-A tubes, the present input transformer in a 203-A set up will be exactly suited. The grid current, incidentally, is nearly linear with grid excitation and practically proportional to power output over most of the operating range. Hence, the grid meter makes an excellent volume-level indicator, showing full power output for a total grid current of approximately 40 ma. with pure tone input and speech power output of corresponding amplitude at half this current value. (See remarks on modulation metering under "Technical Topics" elsewhere in this issue.)

On the output side, the rated load requirements are somewhat different from those given for the 203-A, it will be noticed, although there is sufficient tolerance in the characteristics of these tubes to permit the use of the usual 203-A output transformer without serious sacrifice of undistorted power output capability. At least this has been found so with the modulator previously mentioned and shown in the illustration.

### R. F. APPLICATIONS

There is nothing unusual about the tube in either Class-B or Class-C r.f. circuits except that its grid characteristics permit the safe use of grid-leak bias in Class-C amplifiers, since the plate current drops to a safe value in case of loss of excitation. The recommended r.f. ratings and operating conditions are tabulated as follows:

R. F. Power Amplifier—Class B Telephony:

Carrier Conditions per tube; for use with a modulation factor up to 1.0 (100%).

D.c. plate voltage.....	1250 max. volts
D.c. plate current.....	150 max. milliamperes
R.f. grid current.....	6 max. amperes
Plate input.....	150 max. watts
Plate dissipation.....	100 max. watts

Typical operation:

Filament voltage (a.c.).....	10	10 volts
D.c. plate voltage.....	1000	1250 volts
D.c. grid voltage.....	0	0 volts
D.c. plate current.....	130	106 milliamperes
Peak r.f. input grid voltage (approx.).....	60	58 volts

(Continued on page 30)

## Air-Mass Conditions

(Continued from page 18)

suitably located ultra-high frequency radio transmitters and recorders as an added tool for the meteorologist. Appropriate ultra-high frequency radio links, particularly if operated on a group of frequencies, possibly could serve to advance our knowledge of the continually changing structure of the lower atmosphere.

### ACKNOWLEDGMENT

Without the suggestions, advice and cooperation of Dr. C. F. Brooks of the Blue Hill Observatory of Harvard University, these observations would not have been possible, while without the additional data made available by Mr. G. W. Pickard we would have been greatly handicapped. Thanks are due to Professor H. W. Mimmo at

How many turns?  
 How big a condenser?  
 What size wire?  
 What diameter coil-form?  
 How many micromikes?  
 What frequency range?  
 What shape of coil?  
 How many microhenries?  
 What spacing between turns?  
 What wavelength?  
 How long a coil?  
 How many turns per inch?

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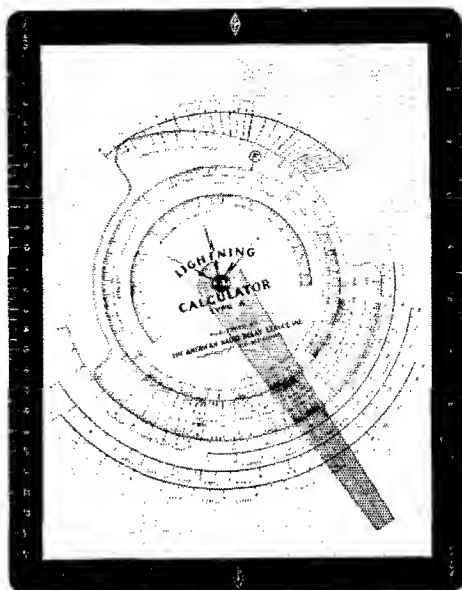
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Cruft Laboratory, Harvard University, for his advice and his exploratory computations. Mr. Harner Selvidge at Harvard University has been particularly generous in very practical assistance and Dr. H. C. Willett and Dr. Karl O. Lange of M.I.T. have given invaluable aid in reviewing the air mass data. Appreciation is also expressed to Mr. Arthur Bent of W1XW, and to Mr. Philip Towle of Blue Hill Observatory who not only maintained some 500 separate communication schedules from that station but aided greatly in the analysis of the meteorological data. Needless to say, the amateurs of the Boston and New York areas have cooperated in characteristic fashion in the work—while the staff at A.R.R.L. Headquarters and Mr. L. W. Webb of W1HBD have done their part throughout the program.

### Operating News

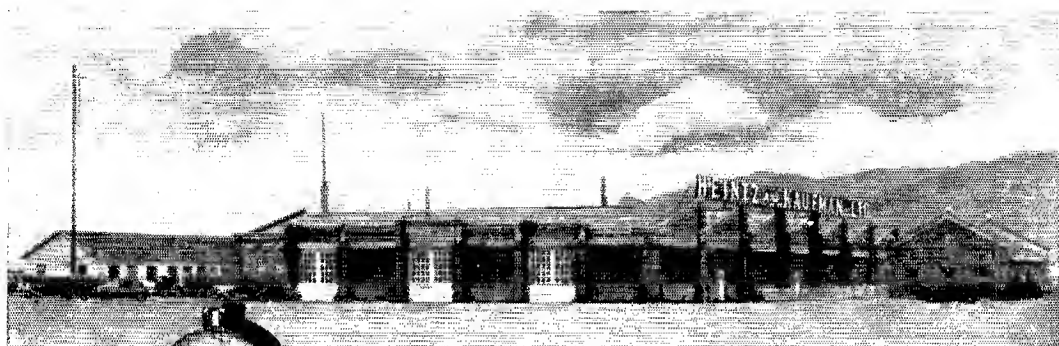
(Continued from page 66)

of "Xtal Control," a new bulletin being published by the Worcester (Mass.) Radio Association. New Hampshire welcomes a new S.C.M.—Robert Byron, W1AVI. Rhode Island does the same—Clayton Gordon, W1HRC. The R. I. 56-mc. bootleggers had a visit from the R. L.—result, lots of studying for ham tickets. The Vermont QSO Party on March 31st brought gratifying reports to the S.C.M. W1GNF and W1EFC tied for high score.

Illinois might well be termed the "Hamfest State"; at least June promises to be a busy month: June 9th—Moline, High-Frequency Communications Assn.; June 16th—Rockford, Forest City Hamfest Committee; June 23rd—Bloomington, Central Illinois Radio Club; June 30th—Starved Rock Radio Club. The R.L.'s apparently were very busy during the past month—Illinois and Indiana report "visits." W9LLV, new P.A.M., is lining up Indiana 1.75-mc. O.P.S. Mrs. W8DYH presented the Michigan S.C.M. with a nine-pound, two-ounce YL! W8WA is holding monthly meetings of 'phone enthusiasts on Broadway, Detroit. W8IKZ, P.A.M., and W8FEE, O.P.S., are demonstrating the value of 56 mc. to dodge summer QRN and every-day QRM. W9PDE has been appointed Assistant S.C.M. for the Upper Peninsula of Michigan. A gala convention is scheduled for Marquette, Mich., on June 22nd-23rd. W8HMH is handling the Ohio position on Trunk Line "B." The Wausau (Wis.) Radio Operators' Club will hold its Field Day on June 8th and 9th at Rib Mountain; all neighboring hams are invited.

The Clinton (Iowa) gang held its yearly hamfest at the shack of W9JZM with about 150 hams attending. An FB hamfest at Wichita, Kans., is also reported. Dust storms upset the routine of numerous midwest hams. Nebraska is winding up an extremely active season, especially in traffic work. W7NH, Idaho, is the only YL S.C.M. in the A.R.R.L. field organization. W7BVE and W7AAT keep Trunk Line "A" running through Montana. The Oregon State Convention at Corvallis, April 13th-14th recorded the largest attendance ever for an Oregon get-together. Portland, Oregon, 'phones solve the QRM problem by confining local QSO's to 56 mc. W7DIW is editing an Oregon Section paper. W7AYO, Washington S.C.M., scored over 19,000 points in the April O.R.S. Party—the highest score on record for a west coast participant! W7IG won first prize in the Washington Section's six months' progressive contest. The western end of Trunk Line "E" is operating "net style" with W7AEA, W7AYO and W7ASA scheduling six nights per week. The Pike's Peak Amateur Radio Association is making regular week-end tests with its portable station, W9OKY, in preparation for the Field Day. Lt.-Comdr. Linkins, N.C.R. Commander of the 12th Naval District, inspected the various N.C.R. units in Colorado; he was accompanied by W9GNK, Section Commander, and W9JQQ.

W5BII, R. M. Cobb, is the new Northern Texas S.C.M.; he's already well known as Chief Route Manager. The Galveston (Texas) Club is building a four-stage transmitter; etom 'net activity is high in preparation for the etorm season. All amateurs interested in the Southern Texas 'Phone Association should write Alhert Rose, San Antonio Radio



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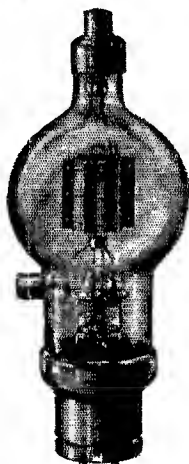
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Club. W8KKG made "WAC," the second in West Virginia. H. S. Carter, W4OG, is new North Carolina S.C.M. Director Caveness, W4DW, Roanoke Division, claims to belong to N.R.A. (we do our part) since the recent addition to his family! W3EZZL reports a Virginia Emergency Net in operation. Three real "old-timers," W1ES, W3BZ and W3CA, hold a three-way contact every Saturday night. The June meeting of the Virginia Floating Club will be held in Norfolk. W3BIG, P.A.M., is lining up a Virginia O.P.S. Net.

## CANADA

### MARITIME DIVISION

**M**ARITIME—SCM, A. M. Crowell, VE1DQ—"VE1" HAMFEST!—HALIFAX, JUNE 1st to 3rd. Tickets \$2.00. YL's XYL's \$1.00 extra. Write VE1FN, FB, or EK for reservations NOW. Prizes, BANQUET, picnic, 56-mc. tests, etc. **THE MORE THE MERRIER**. Nova Scotia: EY schedules HJ for P.E.I. traffic and hits top place. ER will soon be back home from N. Y. FL is pinch-hitting during ER's absence. GL wants more of the gang to report on his O.B. FT is holding daily schedule at 6:15 p.m. with W1BML. HH sends FB report via letter; he has schedule on 56 mc. with IA. EQ is on regularly evenings. BL will soon be on with pair of '45's P.P. DB will be on soon. ET left for Australia with Comm. ticket. EP is busy with studies. DQ at last worked a genuine Asian. FN is on the hop as secretary of H.A.R.C. in addition to studies. DH dropped in on S.C.M. for chat. AG has the D.B. mike going. AW is handling O.B. twice weekly on 3.9-mc. 'phone. BC likes 'phone, but not telephones. (Hi, Bill.) CP says new QRA will have less QRM from locals. GR and AR have nightly schedules on 1.75-mc. 'phone.

Traffic: VE1EY 103 FL 87 GL 37 FT 3 HJ 33.

### ONTARIO DIVISION

**O**NTARIO—SCM, S. B. Trainer, Jr., VE3GT—GG is having troubles with eastern schedule on Trunk Line "I." Glad to have JT back with us again. GT is very QRL with "XTAL." MX reports a lot of activity in Ottawa on 56 mc., and all are eager to arrange schedules or tests with other VE3's. VE9AL is putting in 861 Class B linear. VE3ACS is now using crystal rig. SZ is building for 3.8-mc. 'phone. OR worked his first VK and ZL after ten years on the air. EM hopes it won't take him that long. BZ had a good time operating WA's rig in DX contest. QK moved to Sandwich. DU is doing nice work. ACM is looking forward to some brass pounding following exams. VD worked at K4 at 11:40 a.m. on 7 mc. MB has been very busy with business. TN is rebuilding once more. SG is running nice schedules east. Drop a card to the S.C.M. if you are not receiving "XTAL" . . . the new ham publication. Any news, or dope, is also desired from the gang.

✧ Traffic: VE3GG 25 RK 50 LC 5 JT 9 GT 80 SZ 8 QK 590 DU 43 ABW 2 MB 20 TM 8 SG 48 WK 86. VE9AL 24.

### QUEBEC DIVISION

**Q**UEBEC—SCM, Stan Comach, VE2EE—Traffic moves on apace, HK, our traffic king, is still off the air rebuilding and at the same time changing his QRA, but in his absence DR is doing a noble job and keeping the files clear along the main route. BU is also doing his share. I would like to see a few more worthwhile schedules in operation out of and into Montreal. CO is using an RK20 in his rig. Congratulations on the fine job you made of "Skywire." OM. HF is still having trouble with his single signal. Lot of moving amongst our ranks: IQ, EA, DG, CR, EW, HG and AY are all seeking new fields for QRM. IB, GA and FG purchased ACR 136 receivers. Our old S.C.M. is now on 'phone on 14 mc. CA was over fixing him up; on his first QSO Joe dropped the mike. HG is quite proud of another certificate which adorns his wall; he won the last VK contest. We have quite a few contest winners with us; DR and FG both won prizes in the VE contest. I am grateful to the response for out-of-town reports. IT is having lots of fun getting a Collins net work to function. AC, believe it or not, is using a 14-mc. crystal in his 28-mc. rig. 3CJ, late of Toronto, is now employed in our midst and hopes to hear VE2 in the near future. BB is still handling the odd message. Daddy had a visit from AP and GS. HH was also very pleased to have two visitors in the persons of 3XS and 1EV. The S.C.M. had JV from Sherbrooke to see him. BE and BG have converted their National pre-selectors into the regenerative type, and do they work; ask the old-timers. HM is having a little trouble with the new transmitter. DX is going off the air temporarily due to

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The HANDBOOK is what its name implies. It contains just the dope that you will want for the construction of gear and the intelligent operation of a station. You will find it worth while to read over the chapters on electrical and radio fundamentals before applying for a license. It's a big book for \$1.

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breaking up house. EA has moved bag and baggage to Bishopton. By the time this appears our old friend CH will be over in England; we are sorry to lose you, Bert.

Traffic: VE2DR 270 BB 8 BU 85 AB 10 DD 15 GO 4 HT  
34 AC 4 EE 33 CO 6 EC 8 CA 6 IJ 4 IT 3 IQ 2.

### VANALTA DIVISION

**ALBERTA**—SCM, J. Smalley, Jr., VE4GD—Route Manager BZ has Alberta well lined up with traffic routes in which the following stations take an active part: BZ, AF, OG, LX, GE, QK, HM, SZ. The only city not represented is Medicine Hat. BZ led the traffic men. LX is a farmer, but spends most of his time handling traffic. GE makes a specialty of winning contests. NH has some sure-fire schedules including one in the British Empire network. The last monthly ham dinner was attended by 45 licensed hams. The Alberta 'phone gang is rejoicing over the new bands. LE has been working ZL on 3.9-mc. 'phone. CY and HQ have been getting DX on 14-mc. 'phone but were bested by HW, who snagged a "C" and an "OK." If the station LK worked is what he thinks it was, he has worked W.A.C. Hi. The Alberta gang are asked to keep open the days of Friday and Saturday, July 12th and 13th, when the two Calgary ham clubs will hold a joint hamfest. Those desirous of attending should notify the S.C.M. JP had a visit from HM and is anxiously looking forward to meeting his second ham. Hi. A few more reports for QST will be appreciated.

Traffic: VE4BZ 156 LX 102 GE 98 QK 70 NH 40 OG 34.

**BRITISH COLUMBIA**—SCM, R. K. Town, VE5AC—The Island 1.75-mc. net is carrying on despite difficulties, and has added CT and NS to its membership. FU and EW are experimenting with 56 mc. GU reports that '45's work swell on 3.69 mc. KU and BM are trying to get on 56 mc. JL has a nice new FBX receiver. EZ, the V.S.W.C. station, has put in frequency measuring equipment. HR is just alive. Hi. JL is now keeping schedule with EP. EZ is experimental station of V.S.W.C. EC worked Greenland for his 19th country. HP is busy on 1.75 mc. JA is reliable traffic man on 3.5 mc. GS has 25-watt final now. AL schedules VE4LX for eastern traffic. DZ worked a K6 his first DX. Hi. LQ is commercial operating on "Princess Charlotte." EP is lining up a bunch of schedules. BY is the most active 'phone station in the Section. HY is active on island net. FG worked LY1J and OE3FL for a couple of new countries. NG handled her first message. EO is the speed artist of 7 mc. AC is fighting QRM on T.L. "I." FM keeps up his end of the schedules. AM is using low power on high power tubes, but nobody believes him. Hi. VE5FH is artist de luxe of the "Amachewer."

Traffic: VE5HR 6 JL 16 EZ 2 EC 4 HP 36 JA 23 GS 9 AL  
35 DZ 12 LQ 5 EP 13 BY 10 HY 1 FG 43 NG 1 EO 12 AC  
85 FM 42 AM 1 FH 3.

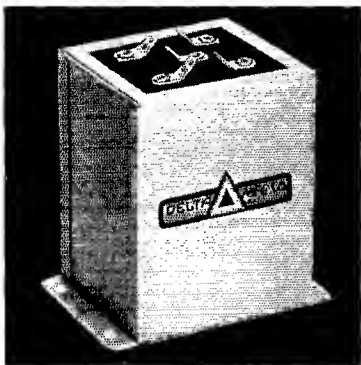
### PRAIRIE DIVISION

**MANITOBA**—SCM, A. J. R. Simpson, VE4BG—The main event of the last month was the ham exhibit put on by the St. James gang. It was very successful and considerable traffic was originated, most important being those forwarded to the Saskatchewan and British Columbia premiers through Trunk Line station at Winnipeg, VE4AG. Congratulations, St. James, for the FB show. KX worked an X and ON. GC, MY, DY, and NI are busy on 14-mc. 'phone these days. SF contacts DK regularly up North. DU has added a few more countries to his DX record. KU is still hooking DX on his '10's. UX will soon be on with his 276A. This was record month for winter for traffic, AG leading with score of 310. FB, Cliff, keep it up. MJ at Russel, reports DX worked and AP just married. Hi. The beginners class of the M.W.E.A. is drawing to a close and all are pretty well set for the R.I. and examination. The M.W.E.A. is holding a big stag for the gang and a large turnout is expected.

Traffic: VE4AG 310 GC 22 IP 6 KX 1.

**SASKATCHEWAN**—SCM, Wilfred Skaife, VE4EL—All set for the hamfest? QS has moved to Lloydminster. GA maintains schedule with KJ, OF and 9DUB. MH, our Acting R.M., does good work lining up local schedule lines. RZ reports he is tired of reading QST and seeing no mention of Sovereign, so sends in traffic report and news. RZ schedules TX and GE. MZ tries DX with '46's in final. UR works Victoria with '01A and 180v. Saskatoon is 100% behind hamfest. MA and MB have nice 'phone QSO with LI and LO at the Pas. RB, MA and MB are going to build portables for 56 and 28 mc. UG's crystal won't perk. UC gets 1 amp, in

Once upon  
a time there  
were no guide-  
posts in amateur  
radio. The sum total of  
all human knowledge of the  
subject was negligible. Then people  
began discovering things. Principles and  
practices were established. Knowledge of the progress  
of development became available in printed form. Eventually  
publication of *QST* was started. And at long last came *The Radio  
Amateur's Handbook*. It represents today a careful sifting of all the world's  
accumulated knowledge of amateur radio. It is the fundamentally important book to  
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antenna. TW has M.O.P.A. UH builds new receiver. PE and UD are going c.c. PW builds new receiver. LI has gone to the Pas. EL tries Collins antenna matcher. FW keeps schedule with Calgary and Los Angeles. The Moose Jaw gang will have transmitter on 3.5, 7 and 28 mc. at Y.M.C.A. Fair to originate traffic and stimulate public interest in amateur radio. CM is replacing burnt-out junk.

Traffic: VE4CM 223 CC 53 RZ 48 PL 42 FW 38 GA 25 PM-EL 7 RE 2.

## Hamdom

(Continued from page 26)

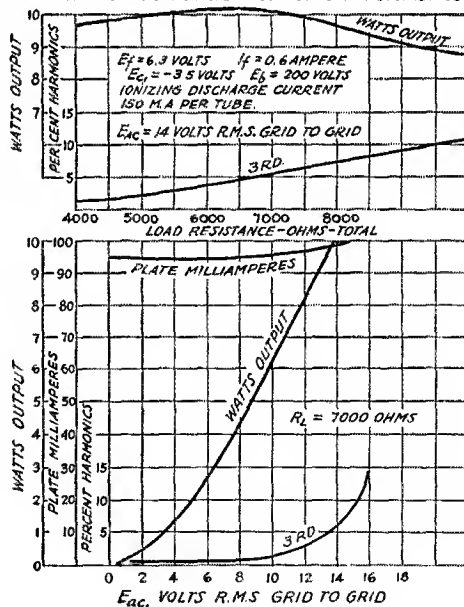
radio men, he joined the Burgess Battery Co. In 1929 he went with Radio and Television Institute. In October, 1932, while flying to Kansas City, he was overcome by carbon monoxide poisoning and invalidated for eighteen months. Now he's back in harness again, for General Household Utilities. The tricks at W9UZ are still maintained, however; get that automatic transmitter singing at you some night and have the time of your life—or have your sending recorded on the automatic recorder.

## A New Hot-Cathode Tube

(Continued from page 25)

the cathode wattage used, namely 4 watts. Considerably more efficiency may be obtained, of course, with the tubes used as either oscillators or high frequency amplifiers, where distortion is

FIG 10  
RK-100 OUTPUT & DISTORTION CHARACTERISTICS



permissible and relatively high values of peak current may be drawn.

Editor's note: The adaptability of this type tube to both audio- and radio-frequency circuits is demonstrated in the 14-mc. 'phone transmitter described elsewhere in this issue.



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# 1935 Supplies for 1935 Stations

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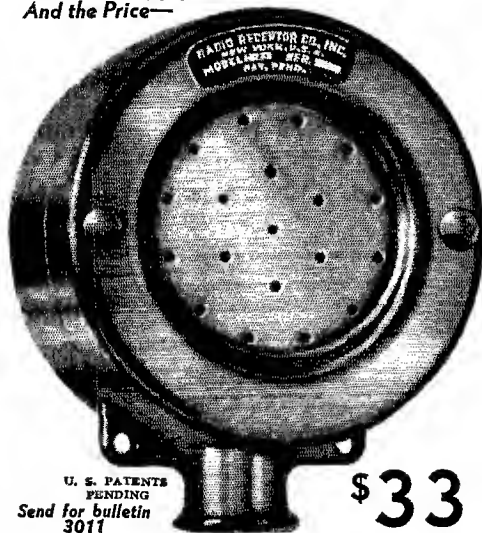
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**\$33**

## A Portable Receiver

(Continued from page 29)

the gain set at maximum, that it was very uncomfortable to wear the headphones. I have never heard such signals from a two-tube receiver.

The results obtained with this receiver have been more than gratifying and the labor involved in making it has been repaid many many times. Reception is quite equal to that on the eight-tube superhet in my home station. Naturally it does not tune as sharply as the superhet, and it is also slightly affected by body capacity, but it certainly does bring in the DX. For example, Algeria, Morocco, Czechoslovakia, Switzerland and Kenya Colony are a few among the many countries copied on this receiver on 14-mc. band, only using the fishpole antenna. All of them were at least  $R_4$  or better. I have set up this receiver in many different locations in the last eight months and in every case have been able to pull in the most surprising amount of real DX.

## Experimenters' Section

(Continued from page 43)

Fig. 5. This makes a dependable fuse, the current carrying capacity of which can be changed by varying the width of the tinfoil. The smaller the tinfoil, of course, the less current it will carry without blowing, and after a little experimenting the right size of strip to use can be determined quite accurately.

—E. W. Hill, Fitchburg, Mass.

## Field-Strength Meter

A note from D. C. Ketcham, W4BBX, encloses data on an inexpensive field-strength meter used by him in making adjustments to his antenna system. It should appeal to those who are deterred from making similar measurements by the expense usually involved in building up such an instrument. He writes:

"To those of the fraternity to whom the purchase of a 0-1 milliammeter represents a major

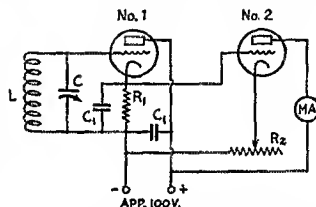


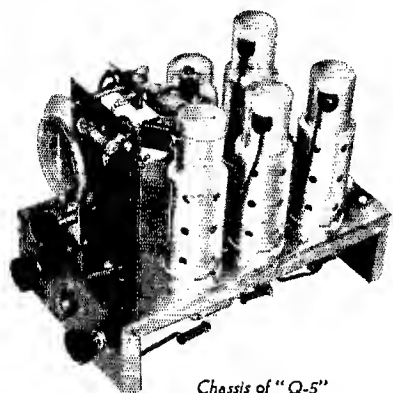
FIG. 6—INEXPENSIVE FIELD-STRENGTH METER

The tuned circuit, LC, should resonate at the operating frequency.  $C_1$  and  $C_2$  are 0.002- $\mu$ fd. or higher-capacity by-passes.  $R_1$  is 50,000 ohms,  $R_2$  a 10,000-ohm variable. The milliammeter, MA, is a 0-5 full-scale instrument. The tubes may be 27's, 56's or similar triode types with indirectly-heated cathodes.

problem in finance, the meter used here will be of interest. It will be seen from the diagram (Fig. 6) that it is a d.c. amplifier. The drop across the cathode resistor of tube 1 is applied to the grid of tube 2 and results in a change in its plate current proportional to the signal applied to tube

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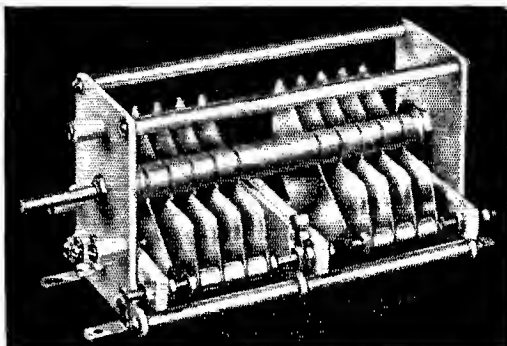
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● Use Matched Condensers and Inductors in your transmitter for highest efficiency! Ask for Bulletin 350 describing the new Johnson "Hi-Q" Transmitting Inductors.



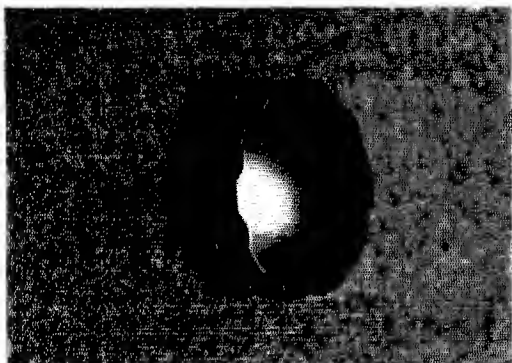
Type "D" Transmitting Condensers are now available with 1/4 inch airgap in Single and Dual-Section models. Other models have 0.080" and 0.175" airgaps.

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**OVERSIZE KNOB:** This large knob,  $2\frac{3}{8}$  inches in diameter, facilitates critical tuning when used to replace standard knobs on FB-7 or other receivers, and it has a comfortable grip which is not tiring in use. Standard equipment on the HRO. Catalog Symbol HRK.

List Price \$8.50

Usual Discounts apply

## NATIONAL COMPANY, INC. MALDEN, MASS.



### It's easy to acquire the CODE

with Instructograph Automatic Code Teacher. You learn at home at whatever time suits you best; Book of Instructions explains each step, just as an instructor would do. Machines for sale or for rent at very attractive terms. Extra tapes also sold separately. Write TODAY for full details; there's no obligation.

INSTRUCTOGRAPH CO., Dept. Q6  
912 Lakeside Place Chicago, Ill.

Representatives for Canada  
RADIO COLLEGE OF CANADA, Ltd., 563 Bay St., Toronto

## The Shure Model 71AS CRYSTAL HAND MICROPHONE

The Model 71AS Crystal Hand Microphone makes available the fine performance of Shure Crystal Microphones in the hand mounting so essential for many applications. The instrument is of the close-talking type with a convenient "push-to-talk" switch in the handle.

List Price.....\$26.50

Models without switch, as well as "non close-talking" Crystal Hand Microphones, are also available. Shure Crystal Microphones are licensed under patents of the Brush Development Company.

Ask your Jobber or see  
QST "Where To Buy It" Section



### SHURE BROTHERS COMPANY

Manufacturers of Microphone Headquarters Telephone  
Engineers DELaware 8383  
215 WEST HURON ST. CHICAGO, ILLINOIS

1, but of greater magnitude. The outfit used here has a variable cathode resistor for biasing the second tube, with a 0-5 milliammeter in its plate circuit. This works well, but battery bias would give greater sensitivity.

"With old 27's or 56's kicking around most ham shacks this rig can be put together at very little cost, and with a sixty-cent milliammeter will give perfect results."

W4BBX supplies filament and plate power for the tubes from a small transformer having an appropriate heater winding and a second output winding giving about 100 volts a.c. No rectifier is used.

## Michigan State Convention

(Continued from page 31)

\$1.25 worth (yes, that is, the registration fee) of good time with a big banquet at the end.

Director Roberts of the Central Division has promised to be present and as this is the first time that a director has attended one of our affairs let us show him that we appreciate his visit by attending the convention and meet him in person.

Further information may be obtained by writing to J. A. Dyer, General Chairman, 818 North Maple St., Ishpeming, Mich.

## Silent Keys

It is with deep regret that we record the passing of these amateurs:

Clifford G. D. Bond, VE3JD, Toronto, Canada

Robert W. Finter, W2UR, Irvington, N. J.

John T. Flynn, W5DXS, Houston, Texas

Willard M. McCulla, W9AE, Waukegan, Ill.

Julian L. McGuire, W4CHR, Anniston, Ala.

H. D. Price, G6HP, London, England

Russell E. Olson, W9ELW, Minneapolis, Minn.

W. R. Smith, W9AQL, Chicago, Ill.

Robert A. Waschek, W4CAR, Lakeland, Fla.

Robert M. Wood, W2HMX, Ossining, N. Y.

Carroll L. Wright, W6FEC, San Bernardino, Calif.

## A.R.R.L. QSL Bureau

FOR the convenience of its members, the League maintains a QSL-card forwarding system which operates through volunteer "District QSL Managers" in each of the nine U. S. and five Canadian districts. In order to secure such foreign cards as may be received for you, send your district manager a standard No. 8 stamped envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so

# PREMIER CRYSTALS Were Used on the Last STRATOSPHERE FLIGHT— *There's a Reason!*

## NEW PREMIER PRICES

Kilocycles	UNMOUNTED		MOUNTED	
	$\pm 0.1\%$	$\pm 0.03\%$	$\pm 0.1\%$	$\pm 0.03\%$
1716-2000	\$7.00	\$10.00	\$9.50	\$12.50
3500-4000				

Kilocycles	UNMOUNTED		MOUNTED	
	$\pm 0.1\%$	$\pm 0.03\%$	$\pm 0.1\%$	$\pm 0.03\%$
1716-2000	\$3.95	\$5.95	\$6.45	\$8.45
3500-4000				
7000-7300	\$5.95	\$7.50	\$8.45	\$10.00

MOUNTED "AT" or "X" cut crystals covered by the above quotations are supplied in Type 182 Isolantite Holder. Type 180-A Holder is optional, but must be specified when ordering. Calibration accuracies are only guaranteed when the crystal is mounted in our own holder, or in a holder checked and approved by us. The percentage figures, which head price columns, represent a tolerance deviation from a requested frequency and not an accuracy of calibration. The actual frequency of the crystal, stamped on each holder, is guaranteed accurate to within the limits of our primary standard, which is maintained constant to slightly over one part in ten million, which, at the fundamental frequency of the 50 kilocycle standard bar, represents an accuracy of 0.005 cycles.

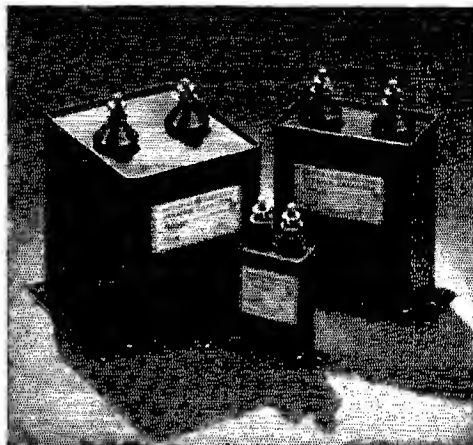
Send for Bulletin 103 describing our complete line of Isolantite low-loss holders



**PREMIER CRYSTAL LABORATORIES, INC.**  
53 PARK ROW, NEW YORK, N. Y.

# YOU CAN DEPEND ON G-E PYRANOL CAPACITORS

THEY'RE inexpensive, too, and scientifically designed. Years of experience in manufacturing capacitors for leading broadcast and short-wave communication stations and the government are built into them. Big, cumbersome capacitors need no longer use valuable space in your transmitter. Nor do you have to worry about fire — Pyranol won't burn. You can use more voltage — G-E Pyranol capacitors will stand continuous operation up to 10 percent above rated d-c. voltage. They make possible better signals and have longer life. Get them from your dealer. Radio Department, General Electric, Schenectady, N. Y.



360-101

# GENERAL ELECTRIC

Say You Saw It in QST — It Identifies You and Helps QST

# SPEED Up Your CODE

GET your COMMERCIAL TICKET! Punch a mill high speed! Copy as much as a sentence behind! Read 35 wpm. like a language! Candler has taught thousands of big league operators, — and almost every one of the Champions, — the fine points you learn at home. Pay for the course as you take it. Stop anytime you wish.



Ted McElroy on March 11 at Chatham, Mass. officially copied 77 words per minute, Continental Code, without error. He's a Candler graduate!

**FREE** Copy of "BOOK of FACTS for RADIO OPERATORS" is yours for the asking. Write TODAY.

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6343 S. KEDZIE AVE. Dept. Q6  
Chicago, Illinois, U. S. A.

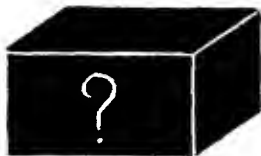


that it has a total of six-cents postage. Your own name and address go in the customary place on the face, and your station call should be printed prominently in the upper-left-hand corner. When you receive cards, you should immediately furnish your QSL manager with another such envelope to replace the used one. List of managers follows:

- W1—Allen W. Jones, W1NW, 1626 Commonwealth Ave., Boston, Mass.
- W2—H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
- W3—R. E. Macomber, W3CZE, 418 10th St., N. W., Washington, D. C.
- W4—B. W. Benning, W4CBY, 520 Whiteford Ave., Atlanta, Ga.
- W5—E. H. Treadway, W5DKR, 2749 Myrtle St., New Orleans, La.
- W6—C. E. Spitz, W6FZQ, Box 1804, Phoenix, Ariz.
- W7—L. Q. Kelly, W7BPC, 4919 So. Prospect St., Tacoma, Wash.
- W8—F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio
- W9—George Dammann, W9JO, 319 Sherman Ave., Evanston, Ill.

- VE1—J. E. Roue, VE1FB, 84 Spring Garden Rd., Halifax, N. S.
- VE2—W. H. Oke, VE2AH, 5184 Mountain Sights Ave., N. D. G., Montreal, P. Q.
- VE3—Bert Knowles, VE3QB, Lanark, Ont.
- VE4—Dr. J. J. Dobry, VE4DR, Killam, Alberta.
- VE5—E. H. Cooper, VE5EC, 2024 Carnarvon St., Victoria, B. C.

## NOW IN PRODUCTION The New Improved Patterson PR-12 (Delivery During June)



Out of months of painstaking research and engineering, the completely revised PR-12 has finally been evolved. It contains every feature an amateur could wish for — and more.

Pre-selection — Accurate Logging Band Spread — Crystal — Modulation and R meter — Built-in Monitor — and dozens of other desirable features. Send for new descriptive folder.

### MARINE RADIO COMPANY

(Formerly L. I. MARINE & ELECTRIC CO.)  
Eastern Distributors

124-11 101st Avenue, Richmond Hill, N. Y.

Telephone: CLEVELAND 3-2400 Cable Address: "Elecmarine"

### Book Review

"SOS to the Rescue," by Karl Baarslag. Published by Oxford University Press, New York City. 310 pages, 18 illustrations. Price \$2.50.

Men who work at a job can often write of that job better than the best of trained writers. Karl Baarslag, who gives us "SOS to the Rescue," is able to write good prose, but that he is at heart a commercial radio operator sticks up through his every phrase and paragraph. That's what makes the book good. He knows whereof he speaks, and what he has not known he has made shift to find out. The result is that his book, although couched in formal and often prosaic English, smacks with the salty tang of true verisimilitude.

"SOS to the Rescue" is a recountal of the major sea disasters—the *Titanic*, the *Vestris*, the *Morro Castle*, and many others—in which radio (thank Heaven for the honesty that eschews the archaic "wireless") played an important part, to which has been added an introductory chapter telling of the origins of CQD and SOS, one on pioneer wirelessmen, another of girl marine operators, and a concluding section of citations of those operators who went down to the sea with their ships listed on the Memorial in Battery Park. The whole is enormously stirring and absorbing, not to mention informative, for many hitherto little-known facts are brought out and many points on which there is still argument are analyzed with gratifying impartiality. If you're a true radio man—commercial or amateur—once you start reading this book you may put it down, but you won't be likely to let it out of your possession until you've finished it.

—C. B. D.



## 1 TO 15 METERS

How do you measure wavelengths in the ultra-short-wave band? You can do it accurately if you have a **General Radio Type 419-A Wavemeter**. Its frequency range is 300 Mc to 20 Mc; each of the plug-in inductors is calibrated accurately in terms of the General Radio primary standard of frequency; resonance is indicated by means of a micro-ammeter in a

vacuum-tube rectifier circuit; power supply from a No. 6 dry cell. The walnut case provides space for dry-cell, inductors and the 4 individually drawn calibration curves: **Type 419-A Rectifier-Type Wavemeter: \$100**

Write for further details, mentioning **QST**

## GENERAL RADIO COMPANY

30 State Street

Cambridge A, Massachusetts

## \*\*\*\*\* THE RADIO SHACK \*\*\*\*\*



## EXTRA SPECIAL!! PYRANOL CONDENSERS 2 MFD.—2000 VOLTS

# \$2.90

● Amazing but nevertheless true — these Pyranols have been subjected to test voltages three and four times the specified rating. They **DO NOT** Break Down —

● Insist that the condenser that you buy be marked Pyranol.

● No restrictions as to use — No Bleeder is necessary — they can be used in condenser or choke input — In fact we guarantee them in any part of the circuit.

● Insist on Pyranol and have no regrets. Ask an amateur who owns them.

### INTERNATIONAL PLATE TRANSFORMERS



Outstanding for value. 750 and 1000 volts each side of c.t. at 300 mills. Cased completely in steel, crackle finish.

Model 3000 — Same in appearance, 750-1000-1500 each side of c.t., 300 mills. .... \$8.95  
We know of nothing that equals the value received in these two items

866's (Heavy Duty) \$1.60

BALDWIN TYPE \$2.50  
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crystals

EIMAC 50T \$13.50  
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### 5 METER SPECIALS

SICKLES 5M Kit .... \$1.20  
Audio trans. with mike winding. .... \$1.20  
Output to match. .... \$1.20  
4 DPT switch. .... \$1.20  
RCA Hand-mike .... \$1.20

V.T. 203A (Graphite Plate) \$9.00

DEFORREST 210's ..... 90c

THE MAG-KEY \$7.95  
Now

TRIPLETT METERS  
0-5 to 500 mills. .... \$3.75  
0-15V a.c. .... \$3.75

### IMMEDIATE DELIVERY

RCA 136 receiver. .... \$69.50  
SUPER SKYRIDER, \$59.95  
PIONEER Gen-E-Motor  
250V 50 mills. .... \$10.80

### THORDARSON CASED TRANSFORMERS

600V each side c.t. 200 mills  
2.5V-10A, 5V-3A \$2.75  
7.5V-3A

2.5V-12A transformer. For  
866's. .... \$1.25

8H-300 mill choke. .... \$2.00

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10 volt 6.5A Transformer  
(cased). .... \$2.10

Fil. Trans. for 4-83s in bridge  
\$3.00

OHMITE  
200 WATT  
RESISTORS  
(adjustable)  
500 to 100,000 Ohms  
\$1.50

Mail orders filled.  
Please send M.O.  
Foreign customers.  
Payment must be  
made here. Cannot  
ship C.O.D.

**THE RADIO SHACK**  
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BOSTON, MASS.

TURNER  
Crystal  
Microphone  
\$13.50

KENCO, JR.  
Semi-automatic  
Key  
\$3.95



# The Radio Amateur's LICENSE MANUAL

(No. 9 in the series entitled  
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A NECESSITY for the beginner—equally indispensable for the already licensed amateur. Going after your first ham "ticket"? You need the manual for its instructions on where to apply, how to go about it in the right way—and, most important of all, for the nearly 200 typical license exam. questions and answers. Already got a license? The manual is still necessary—for its dope on renewal and modification procedure, the Class A exam. (with questions and answers), portable procedure, etc.

All the dope on every phase of amateur licensing procedure, and, of course, the complete text of the new regulations and pertinent extracts from the basic radio law.

ORDER YOUR COPY TODAY

25c postpaid (no stamps, please)

## HINTS AND KINKS FOR THE RADIO AMATEUR

(No. 10 in the A.R.R.L. series entitled  
The Radio Amateur's Library)

AMATEURS are noted for their ingenuity in overcoming by clever means the minor and major obstacles they meet in their pursuit of their chosen hobby. An amateur must be resourceful and a good tinkerer. He must be able to make a small amount of money do a great deal for him. He must frequently be able to utilize the contents of the junk box rather than buy new equipment. This book is a compilation of hundreds of good ideas which amateurs have found helpful. It will return its cost many times in money savings—and it will save hours of time. Why try to figure these things out for yourself? You might just as well profit by the experience of others. Order your copy today.

80 PAGES in ATTRACTIVE PAPER COVERS

Price 50 cents

(No stamps, please), postpaid anywhere

American Radio Relay League, Inc.  
West Hartford, Conn.

## The New 838

(Continued from page 74)

D.c. grid current (approx.)** (at crest of a.f. cycle).....	65	60 milliamperes
Driving power (approx.)** (at crest of a.f. cycle).....	12	10 watts
Power Output* (approx.)** (at crest of a.f. cycle).....	40	42.5 watts

### As Plate-Modulated R. F. Power Amplifier— Class C Telephony:

Carrier Conditions per tube; for use with a modulation factor up to 1.0 (100%).

D.c. plate voltage.....	1000 max. volts
D.c. plate current.....	175 max. milliamperes
D.c. grid current.....	70 max. milliamperes
R.f. grid current.....	6 max. amperes
Plate input.....	175 max. watts
Plate dissipation.....	67 max. watts

#### Typical operation:

Filament voltage (a.c.).....	10	10 volts
D.c. plate voltage.....	750	1000 volts
D.c. grid voltage (approx.) ..	-100	-135 volts
Peak r.f. input grid volt. (approx.).....	220	255 volts
D.c. plate current.....	150	150 milliamperes
D.c. grid current (approx.)**.	60	60 milliamperes
Driving power (approx.) **...	14	16 watts
Power output (approx.).....	65	100 watts

### R. F. Power Amplifier and Oscillator—Class C Telephony:

Key-down Conditions per tube:

D.c. plate voltage.....	1250 max. volts
D.c. plate current.....	175 max. milliamperes
D.c. grid current.....	70 max. milliamperes
R.f. grid current.....	7.5 max. amperes
Plate input.....	220 max. watts
Plate dissipation.....	100 max. watts

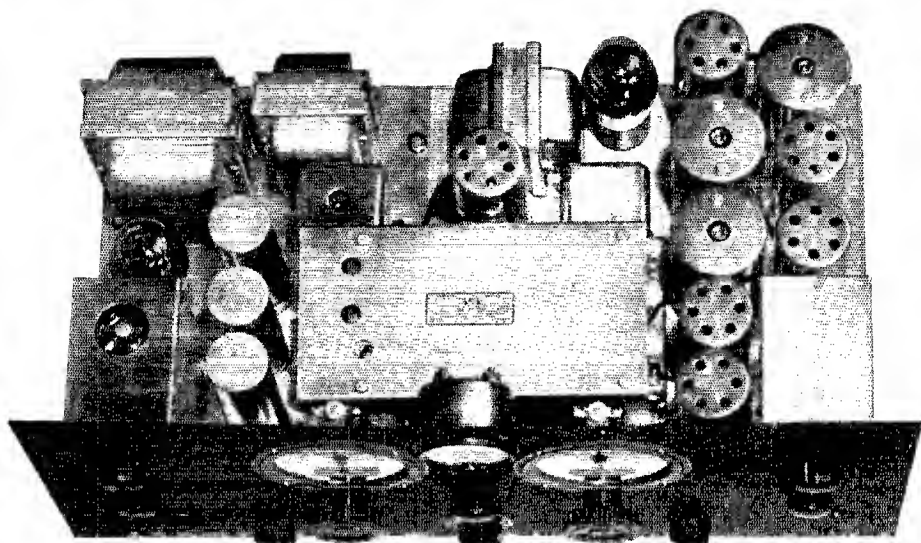
#### Typical operation:

Filament voltage (a.c.).....	10	10	10 volts
D.c. plate voltage.....	750	1000	1250 volts
D.c. grid voltage (approx.).....	-80	-85	-90 volts
Peak r.f. grid input voltage (approx.).....	190	195	200 volts
D.c. plate current.....	150	150	150 milliamperes
D.c. grid current (approx.)**.	30	30	30 milliamperes
Driving power (approx.)**.....	6	6	6 watts
Power output (approx.).....	65	100	130 watts

\*\* Subject to wide variations depending on the impedance of the load circuit. High-impedance load circuits require more grid current and driving power to obtain the desired output. Low-impedance circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driving stage should have a tank circuit of good regulation and should be capable of delivering considerably more than the required driving power.

The 838 may be used at full ratings at frequencies as high as 30 mc. (10 meters). It is also feasible to operate the tube in carefully-tuned and well-designed circuits at still higher frequencies provided the plate voltage is reduced in accordance with the following table. At these frequencies, special attention should be given to adequate ventilation and the maintenance of normal ambient temperatures.

Frequency.....	30	60	90 megacycles
Plate voltage (max.)			
Class-B Telephony.....	1250	800	600 volts
Class-C Telephony.....	1250	800	600 volts
Class-C Telephony.....	1000	650	450 volts



**RME-9D STANDARD — 550 KC TO 23,000 KC**  
**RME-9D SPECIAL — 1450 KC TO 32,000 KC**

To the amateur operator and to those who would prefer to have a receiver incorporating all of the fine features for which our standard model has become so well-known on the air, we now offer a special model RME-9D to include the 10 meter amateur band. Summer-time is a good time to get started on the 28 to 30 MC band. Here is a single signal super with all of the fine selective RME-9D features which will give you outstanding performance. A complete descriptive circular will be sent on request.

**RADIO MFG. ENGINEERS, INC.**

313 BRADLEY AVENUE

PEORIA, ILLINOIS



GET THE RIGHT START IN AMATEUR RADIO—OBTAIN A COPY OF

*The 1935 Edition of*  
**HOW TO BECOME A  
 RADIO AMATEUR**

(No. 8 in the A.A.R.L. series entitled The Radio Amateur's Library)

Completely done over in 1935 style, telling all about amateur radio and describing the latest equipment.

- push-pull crystal transmitter
- bandspread receiver
- simplest of monitors
- giving modern operating instructions

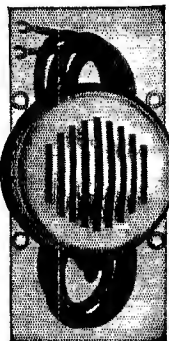
The fourth edition of "How to Become a Radio Amateur" marks another milestone in amateur development.

Universally recognized as the standard elementary guide for the prospective amateur, the 1935 edition of HOW TO BECOME A RADIO AMATEUR describes, in clear, understandable language, apparatus incorporating features hitherto confined to more advanced stations. Although completely modernized, the station can still be built at a minimum of expense, and the designs have been made flexible so that parts out of the junk box readily can be substituted. While easy to build, the performance of the equipment is such that any amateur can own and operate it with satisfaction and pleasure. Complete operating instructions and references to sources of detailed information on licensing procedure are given, as well as a highly absorbing narrative account of just what amateur radio is and does.

25c (no stamps, please) postpaid anywhere

**THE AMERICAN RADIO RELAY LEAGUE, WEST HARTFORD, CONN.**

# The TURNER (Type G) Crystal Mike



The microphone that has swept into instant popularity with the better amateur stations. This popular microphone is now available for push-pull input, being furnished when so ordered with a two conductor shielded cable at no extra cost. This arrangement eliminates inductive interference and greatly decreases line loss on long leads. Free circuit diagram on request. The Turner Type G Crystal Microphone lists at \$22.50.

Usual amateur discount from your jobber. Licensed under patents of the Brush Development Company.

**THE TURNER COMPANY**  
CEDAR RAPIDS, IOWA

## New BIRNBACH 5-METER ANTENNA

**I**DEAL for portable 5-meter transceivers and beam arrays. Three aluminum tube sections, adjustable to desired frequency from 3-ft. (closed) to 9-ft. (open), and tightly locked by brass bushings. Highly efficient (4 1/2" high) standoff insulator base.

Two types: (1) Complete with standoff, \$3.00 list. (2) Extensible antenna only, with 1/4-20 threaded end for attaching to insulator, directly to transceiver or other portables, \$2.50 list.

Write Dept. Q-6 for Details

**BIRNBACH RADIO CO., Inc.**  
145 HUDSON STREET NEW YORK CITY



## SOS TO THE RESCUE

By Karl Baarslag

This book by a wireless operator tells, largely in their own words, the radio operators' stories of marine disasters and rescues, some never before fully revealed, from the days of Jack Binns and the first CQD down to Rogers and Alagna of the *Morro Castle*. Illustrated.

\$2.50

**OXFORD UNIVERSITY PRESS**  
114 Fifth Avenue, New York

## New England Division Convention

**T**HREE of the thirteen annual New England Division A.R.R.L. conventions have been held in the city of Worcester, Mass. Most recent and most notable of the three, the one held on April 26th and 27th was a typical New England gathering—conservatively, intelligently, interestingly and suavely presented.

Following inspection trips to WTAG, WORC, and other points, there was a general assembly in the main ballroom at which addresses of welcome were tendered by Donald S. Bennett, W1BPH, chairman of the general convention committee, and Harold A. Johnson, W1DA, president of the Central Massachusetts Radio Association. At the general communications meeting, presided over by Percy C. Noble, S.C.M. for Western Mass., Communications Manager F. E. Handy reported to and received opinions from the gang on numerous C.D. matters. The I.A.R.U. meeting, conducted by Clinton B. DeSoto, was highlighted by a DX open forum. P. C. McGaughey, of RCA-Victor, concluded the Friday afternoon session with a graphic illustrated discussion of "Receiving Antennae Systems."

Shortly after 7:00 p.m. busses transported a large number to Worcester Tech, where Prof. T. H. Morgan and the W.P.I. Radio Club offered demonstrations of modern applications of electricity. From there, all adjourned to the Chamber of Commerce building, next door to the Baneroff, where an interesting and competent routine of chorus, tap, specialty and aerobic dancing, as well as Hawaiian music and sleight-of-hand, offered a new and pleasing convention note. At midnight, the traditional R.O.W.H. initiation, ably coached and presented by A. E. Boyden, wound up a full first day.

The Saturday morning sessions got under way a bit confusedly, but by 1:00 o'clock there had been held Army, Navy and 'phone meetings, an open forum under the chairmanship of Fieldman A. A. Hebert, and T. R. McElroy's demonstration of high speed telegraphy. At 1 p.m., then, L. S. Fox, of the National Carbon Co., discussed "Super Regeneration" in terms to enable everyone to understand it. John L. Reinartz divided his time between cathode-ray oscilloscopes and antennas. James J. Lamb presented a discussion of "Receiver Circuits for Reducing Electrical Interference." A large group occupied the auditorium for the Saturday afternoon sessions. The technical gathering was concluded by Roy C. Corderman, W3ZD, who, under "Something New in Crystals," told how to accomplish wide frequency changes by special air-gap variation treatment. Meanwhile, the New England Division Radiophone Association meeting was going on in the Chamber of Commerce Building.

Speakers at the banquet were the Hon. John C. Mahoney, mayor of Worcester; Dr. H. Eugene Watkins, Worcester's "T.O.M."; Walter Butterworth, beloved Boston R.I.; A. A. Hebert;

(Continued on page 98)

# Where to buy it

*A directory of suppliers who carry in stock the products of these dependable manufacturers.*

## Super SKYRIDER the hallicrafters

BUTLER, MISSOURI	211-215 N. Main Street Henry Radio Shop
CHICAGO, ILLINOIS	415 S. Dearborn Street Chicago Radio Apparatus Company
CHICAGO, ILLINOIS	520 S. State Street Midwest Radio Mart
CHICAGO, ILLINOIS	226 W. Madison Street Newark Electric Company
FARGO, N. D.	123 Broadway Dakota Electric Supply Company
KANSAS CITY, MO.	1012 McGee Street Burststein-Applebee Company
MOLINE, ILL.	1631-5th Avenue Lofgren's
ST. LOUIS, MO.	927 Pine Street Gordon Radio Company
ST. PAUL, MO.	2484 University Ave. Lew Bonn Company



BUTLER, MISSOURI	211-215 N. Main Street Henry Radio Shop
CHICAGO, ILLINOIS	226 W. Madison Street Newark Electric Company
CHICAGO, ILL.	520 S. State Street Midwest Radio Mart
CLEVELAND, OHIO	2073 West 85 Street Northern Ohio Laboratories
DETROIT, MICHIGAN	129 Selden Avenue Radio Distributing Company
GRAND RAPIDS, MICH.	235 Market Street, S. W. Radio Distributing Company
LA CROSSE, WIS.	131 South 6th St. SOS Radio Supply Co.

LANSING, MICHIGAN	1444 Sheridan Street Wm. Gram Distributing Company
MOLINE, ILL.	Bengston's Radio Store 1420 5th Ave.
WINNIPEG, CAN.	Electrical Supplies, Ltd. 310 Ross Ave.



BUTLER, MISSOURI	211-215 N. Main Street Henry Radio Shop
CHICAGO, ILLINOIS	520 S. State Street Midwest Radio Mart
CHICAGO, ILLINOIS	833 W. Jackson Blvd. Allied Radio Corporation
CHICAGO, ILLINOIS	415 S. Dearborn Street Chicago Radio Apparatus Company
CINCINNATI, OHIO	633 Walnut Street Steinberg's, Inc.
CLEVELAND, OHIO	2073 West 85 Street Northern Ohio Laboratories
COLUMBUS, OHIO	178 N. 3rd Street Hughes-Peters Electric Corp.
DAYTON, OHIO	140 E. 3rd Street Burns Radio Company
DES MOINES, IOWA	1212 Grand Avenue Iowa Radio Corporation
DETROIT, MICHIGAN	171 E. Jefferson Ave. Radio Specialties Company
GRAND RAPIDS, MICH.	235 Market Street, S. W. Radio Distributing Company
INDIANAPOLIS, IND.	316 N. Illinois Street State Distributing Company
KANSAS CITY, MO.	1012 McGee Street Burststein-Applebee Company
KANSAS CITY, MO.	1515 Grand Avenue Radio Laboratories
LOUISVILLE, KY.	911 W. Broadway P. I. Burks & Company
MILWAUKEE, WIS.	332 W. State Street Radio Parts Company

*Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.*

# Where to buy it

*A directory of suppliers who carry in stock the products of these dependable manufacturers.*

**OMAHA, NEB.** 2855 Farnham Street  
Radio Accessories Company

**PEORIA, ILLINOIS** 707 Main Street  
Klaus Radio & Electric Company

**SIOUX CITY, IOWA** 647 Water Street  
Warren Electric Company

**ST. LOUIS, MO.** 1100 Pine Street  
Walter Ashe Radio Company

**ST. PAUL, MINN.** 2484 University Avenue  
Lew Bonn Company

**WINNIPEG, CAN.** 310 Ross Ave.  
Electrical Supplies, Ltd.



**BUTLER, MO.** 211 N. Main St.  
Henry Radio Shop

**CHICAGO, ILL.** 226 W. Madison Street  
Newark Electric Company

**CHICAGO, ILL.** 833 W. Jackson Blvd.  
Allied Radio Corporation

**CHICAGO, ILL.** 520 S. State Street  
Midwest Radio Mart

**CINCINNATI, OHIO** 633 Walnut Street  
Steinberg's, Inc.

**CLEVELAND, OHIO** 2073 West 85 Street  
Northern Ohio Laboratories

**CLEVELAND, OHIO** 1301 Superior Avenue  
Cleveland Distributing Co.

**DETROIT, MICHIGAN** 129 Selden Avenue  
Radio Distributing Company

**DETROIT, MICH.** 171 E. Jefferson Ave.  
Radio Specialties Co.

**GRAND RAPIDS, MICH.** 235 Market Street, S. W.  
Radio Distributing Co.

**KANSAS CITY, MO.** McGee at 23rd Street  
Moser & Suor, Inc.

**KANSAS CITY, MO.** 1012 McGee Street  
Burstin-Applebee Company

**LA CROSSE, WIS.** 131 South 6th St.  
SOS Radio Supply Co.

**LOUISVILLE, KY.** 715 S. Seventh Street  
Universal Radio Supply Company

**PEORIA, ILL.** 707 Main Street  
Klaus Radio & Electric Company

**TOLEDO, OHIO** 1013 Jefferson Ave.  
Baumgardner Distributing Co.



**BUTLER, MO.** 211 N. Main St.  
Henry Radio Shop

**CHICAGO, ILL.** 520 S. State Street  
Midwest Radio Mart

**CHICAGO, ILL.** 226 W. Madison Street  
Newark Electric Company

**CHICAGO, ILLINOIS** 833 W. Jackson Blvd.  
Allied Radio Corporation

**CHICAGO, ILLINOIS** 415 S. Dearborn Street  
Chicago Radio Apparatus Company

**CINCINNATI, OHIO** 633 Walnut St.  
Steinberg's, Inc.

**CINCINNATI, OHIO** 111 East 5th Street  
Krauss Radio Stores, Inc.

**CLEVELAND, OHIO** 2073 West 85 Street  
Northern Ohio Laboratories

**CLEVELAND, OHIO** 610 Huron Road  
Goldhamer, Inc.

**COLUMBUS, OHIO** 178 N. 3rd Street  
Hughes-Peters Electric Corp.

**DAYTON, OHIO** 140 E. 3rd Street  
Burns Radio Company

**DES MOINES, IOWA** 1212 Grand Avenue  
Iowa Radio Corporation

**DETROIT, MICHIGAN** 1326 E. Congress Street  
Aitken Radio Corp.

**DETROIT, MICHIGAN** 129 Selden Avenue  
Radio Distributing Company

**DETROIT, MICH.** 171 E. Jefferson Ave.  
Radio Specialties Co.

**FARGO, N. D.** 123 Broadway  
Dakota Electric Supply Company

# Where to buy it

*A directory of suppliers who carry in stock the products of these dependable manufacturers.*

**FORT WAYNE, IND.** 130 West Columbia Street  
Protective Electrical Supply Co.

**GRAND RAPIDS, MICH.** 235 Market Street, S. W.  
Radio Distributing Company

**MADISON, WISC.** 201 E. Washington Ave.  
Taylor Electric Co.

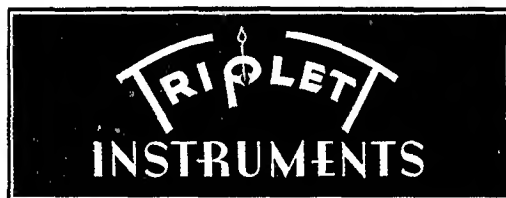
**MILWAUKEE, WISC.** 720 N. Jackson St.  
Taylor Electric Co.

**PEORIA, ILL.** 707 Main Street  
Klaus Radio & Electric Company

**ST. PAUL, MINN.** 2484 University Ave.  
Lew Bonn Company

**TOLEDO, OHIO** 1014 Madison Avenue  
Aitken Radio Corp.

**YOUNGSTOWN, OHIO** 46 E. Federal Street  
Ross Radio Company



**BUTLER, MISSOURI** 211-215 N. Main Street  
Henry Radio Shop

**CHICAGO, ILL.** 226 W. Madison Street  
Newark Electric Company

**CHICAGO, ILL.** 520 S. State Street  
Midwest Radio Mart

**CINCINNATI, OHIO** 633 Walnut Street  
Steinberg's, Inc.

**CLEVELAND, OHIO** 610 Huron Road  
Goldhamer, Inc.

**DETROIT, MICH.** 1326 E. Congress Street  
Aitken Radio Corp.

**DETROIT, MICH.** 5027 Hamilton Ave.  
Rissi Bros.

**FARGO, N. D.** 123 Broadway  
Dakota Electric Supply Co.

**TOLEDO, OHIO** 1014 Madison Ave.  
Aitken Radio Corp.



**CHICAGO, ILL.** 520 S. State Street  
Midwest Radio Mart

**CHICAGO, ILL.** 226 W. Madison Street  
Newark Electric Company

**CHICAGO, ILL.** 833 W. Jackson Blvd.  
Allied Radio Corp.

**CLEVELAND, OHIO** 610 Huron Road  
Goldhamer, Inc.

**DES MOINES, IOWA** 1212 Grand Ave.  
Iowa Radio Corporation

**DETROIT, MICH.** 5027 Hamilton Ave.  
Rissi Bros.

**DETROIT, MICH.** 171 E. Jefferson Ave.  
Radio Specialties Co.

**LOUISVILLE, KENTUCKY** 911 W. Broadway  
P. I. Burks & Company

**LOUISVILLE, KENTUCKY** 715 S. Seventh Street  
Universal Radio Supply Company

**ST. PAUL, MINN.** 2168 Ann Arbor St.  
R. R. Bauman Co.

**TOLEDO, OHIO** 1014 Madison Ave.  
Aitken Radio Corp.



**CHICAGO, ILL.** 415 S. Dearborn St.  
Chicago Radio Apparatus Co.

**CHICAGO, ILL.** 226 W. Madison St.  
Newark Electric Co.

**CHICAGO, ILL.** 520 S. State St.  
Midwest Radio Mart

**DETROIT, MICH.** 171 E. Jefferson Ave.  
Radio Specialties Co.

**DOVER, OHIO** 313 Factory St.  
The Kremer-Weber Co.


**FARGO, N. D.** 121-123 Broadway  
Dakota Electric Supply Co.

**FLINT, MICH.** 711 W. Dayton St.  
Wilke and Sessions

**Q S T**

# HAMS!

**HERE'S A BUY...**



Type  
22C 86  
.002 MFD  
7000 V. D.C.  
MICA  
CAPACITOR  
YOUR COST  
**\$3.15**

By use of mica the loss of power flowing through the capacitor is 1/20 that of ordinary or flint glass dielectric capacitors.

Available at  
Nation's Lead-  
ing Distributors



Get your copy of the #128 catalog illustrating in detail these mica condensers.

## CORNELL-DUBILIER

CORPORATION

4373 BRONX BOULEVARD  
NEW YORK

**WHEN BETTER AERIALS ARE MADE  
LYNCH WILL MAKE THEM...  
AND OTHERS WILL TRY TO COPY THEM**

Write for Free Bulletin on **LYNCH**  
**PATENTED and GUARANTEED**  
**Noise-Reducing Antennas for Home, Auto Use.**  
**ARTHUR H. LYNCH, INC., 227 Fulton St., N. Y.**  
**PIONEER OF NOISE-REDUCING AERIALS**

## GENTRY CRYSTALS

X-CUT  
1715—2000 & 3500—4000 Kc. \$2.00; Exact Kc. \$3.00  
7000—7300 Kc. \$25 Kc. \$3.00; 5 Kc. \$3.75

A-CUT  
1715—2000 & 3500—4000 Kc. \$5.00; Exact Kc. \$7.50

Bulletin on Request

### GENTRY LABORATORIES

503 W. Maple Ave.

Independence, Mo.

## OUTDOOR QSO's

WITH THE NEW COMPACT

MOBILE and PORTABLE

### Duplex Transmitter-Receiver Units

Containing Medium Power Transmitters—

Tuned R. F. Receivers

WRITE FOR BULLETIN C

**RADIO TRANSCIEVER LABORATORIES**

86-27—115th Street Richmond Hill, N. Y.

## New England Division Convention

(Continued from page 98)

F. E. Handy; Roy C. Corderman, W3ZD; Donald S. Bennett; Harold A. Johnson; Capt. George Morris; Ensign Clarence J. Green; Lt. Col. D. S. Boyden, president of the N.E.D. Radiophone Assn., and, first as well as last, Director George W. Bailey, toastmaster.

Boston has it for 1936, and all that can't be done in putting over a great ham convention. they promise to do! BCNU there.

—C. B. D.

## Circulation Statement

**I**N COMPLIANCE with the regulations of the Code Authority for the Periodical Publishing & Printing Industry (A-3), we print the following:

### PUBLISHER'S STATEMENT OF CIRCULATION

This is to certify that the average circulation per issue of *QST* for the six months' period July 1st to and including December 31st, 1934, was as follows:

Copies sold .....	39,798
Copies distributed free .....	344

Total .....	40,142
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American Radio Relay League,  
38 LaSalle Road,

West Hartford, Conn., U. S. A.  
By *K. B. Warner*, Secretary

Subscribed to and sworn before me on  
this 19th day of March 1935.

*Alice V. Scanlan*  
Notary Public

## A New Type Crystal Microphone

**T**HE new Shure crystal microphone differs from the conventional diaphragm-actuated types in the method used for coupling the dural diaphragm to the "bimorph" piezo-electric crystal unit. Instead of the ordinary direct coupling, a "matched impedance" mechanical linkage based on the cantilever principle is employed, increasing the efficiency of the energy transfer from the diaphragm to the crystal. The manufacturer claims increased sensitivity and better overall frequency response. The sensitivity is such that many amplifiers have sufficient inherent gain to permit use of the microphone without pre-amplification. With a low-gain single-stage preamplifier the output level is - 30 db. A typical frequency response curve shows a characteristic flat within 6 to 8 db. from 30 to 10,000 cycles, with a gradual rise at the high frequency end. An amplifier with a somewhat "distorted" frequency characteristic is therefore required for flat overall response—the sort of amplifier most amateur 'phones have. When used under average circumstances, sibilants and other high note characteristics will be present in high degree. This characteristic of crystal micro-





### • NOTE •

The illustration shows each binder with a yearly mark. This marking is not stamped on the binder. Simply cut the year label from a calendar, or paste on a piece of paper, marking it in your own handwriting.

## TO

- enhance the appearance of your station
- facilitate your reference work
- preserve the records of the advancement of the radio art

YOU NEED

# QST Binders

One for this year's issues and one for each of the accumulated year's issues that you have. It will accommodate twelve issues of QST and a yearly index. The QST Binder is covered in deep maroon cloth. It is cleverly designed to take each issue as received and hold it firmly without mutilation. It permits the removal of any desired issue without disturbing the rest of the file.

(Not available outside of the United States and Possessions, and Canada)

A GOOD INVESTMENT AT

**\$1.50 POSTPAID**

**AMERICAN RADIO RELAY LEAGUE, WEST HARTFORD, CONN.**

"The Crystal Specialists Since 1925"

## PIEZO-ELECTRIC CRYSTALS

Guaranteed Accurate to BETTER than .01%

## SCIENTIFIC RADIO SERVICE

UNIVERSITY PARK, HYATTSVILLE, MD.

"Quicker than a Short circuit"

## LITTELFUSES

- INSTRUMENT LITTELFUSES, for meters, 1/400 amp. up.
- HI-VOLT. LITTELFUSES for transmitters, etc., 1,000, 5,000 & 10,000 volt ranges, 1/4 amp. up.
- NEON VOLTAGE FUSES & Indicators (TATTELITES) 100, 250, 500, 1,000 & 2,000 volt ratings.
- AIRCRAFT FUSES, AUTO FUSES, FUSE MOUNTINGS, etc. Get New Cat. No. 6.

Littelfuse Labs., 4509 Ravenswood Ave., Chicago, Ill.

Established

1906



Antenna Coupler



Receiver Coupler



Power Line Filter



Radio

**PURATONE Products for Scientific Noise Reduction**

Write for Cat. 235-R for All Service Needs



Electrical

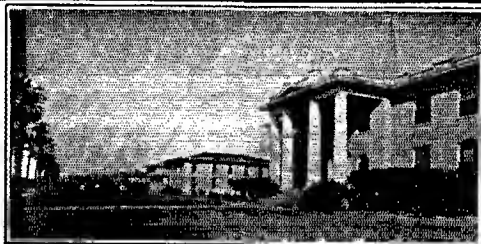
L. S. BRACH Mfg. Corp.

NEWARK, N. J.



Test-O-Lite

**Radio Engineering Complete in Telegraphy-Telephony**



**Studio Technique and Transmitter Operating Experience Guaranteed**

K P A C

500-Watt

1260 Kilocycles

IN 3 to 7 months we train you to secure Commercial Telegraph Second-class, and Radiotelephone First-class government licenses. Course consists of Wireless Code, Radiophone, Microphone-Studio Technique, Service, Police, and Aeronautical Radio. We are authorized to teach RCA texts. At completion of course you receive practical studio technique experience in our commercial broadcast studios located in administration building, and experience as an operator on K-P-A-C (500-Watt Commercial transmitter located on the campus and owned and operated by the college), and WPA, 4000-Watt Commercial Wireless Station. If interested, write for Bulletin R.

**PORT ARTHUR COLLEGE**

Port Arthur (world-known port) Texas

Say You Saw It in QST — It Identifies You and Helps QST

# To OUR READERS who are not A.R.R.L. Members

YOU should become a member of the League! That you are interested in amateur radio is shown by your reading of QST. From it you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have QST delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

*A bona fide interest in amateur radio is the only essential qualification for membership*

AMERICAN RADIO RELAY LEAGUE  
West Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose \$2.50 (\$3.00 outside of the United States and its Possessions, and Canada) in payment of one year's dues, \$1.25 of which is for a subscription to QST for the same period. Please begin my subscription with the ..... issue. Mail my Certificate of Membership and send QST to the following name and address.

.....  
.....  
.....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of QST?

.....

*Thanks*

phones, by the way, compensating for the deficiencies of the speech system, is one of the principal reasons for their popularity among amateurs.

The cantilever-diaphragm-type crystal microphone, model 70H, is manufactured by Shure Bros. Co., 215 West Huron St., Chicago, Ill.

—C. B. D.

## Standard Frequency Transmission

Date	Schedule	Station	Date	Schedule	Station
June 5	C	W9XAN	July 3	C	W9XAN
June 7	B	W9XAN	July 5	B	W9XAN
	A	W6XK		A	W6XK
June 12	BB	W9XAN	July 10	BB	W9XAN
June 14	BB	W6XK	July 12	BB	W6XK
	A	W9XAN		A	W9XAN
June 15	BX	W6XK	July 13	BX	W6XK
June 16	C	W6XK	July 14	C	W6XK
June 21	A	W6XK	July 19	A	W6XK
June 28	B	W9XAN	July 26	B	W9XAN
	B	W6XK		B	W6XK
			July 31	C	W9XAN

### STANDARD FREQUENCY SCHEDULES

Time (p.m.)	Sched. and Freq. (kc.) A	B	Time (p.m.)	Sched. and Freq. (kc.) BB	C
8:00	3500	7000	4:00	7000	14,000
8:08	3600	7100	4:08	7100	14,100
8:16	3700	7200	4:16	7200	14,200
8:24	3800	7300	4:24	7300	14,300
8:32	3900		4:32		14,400
8:40	4000				

Time (a.m.)	Sched. & Freq. (kc.) BX
6:00	7000
6:08	7100
6:16	7200
6:24	7300

The time specified in the schedules is local standard time at the transmitting station. W9XAN uses Central Standard Time, and W6XK, Pacific Standard Time.

### TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes divided as follows:

2 minutes—QST QST de (station call letters).  
3 minutes—Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W9XAN is "O"; and that of W6XK is "M."

1 minute—Statement of frequency in kilocycles and announcement of next frequency.

2 minutes—Time allowed to change to next frequency.  
W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles. Calif., Harold Peery in charge.

### Copying Bee

(Continued from page 52)

HOMONYM JINNEE ICHNEUMON ZOOPHYTE LYD-  
DITE NAIVETE PYJAMA REREDOS QUEUE VIVAVOCE  
GEISHA SKOVVEIEN ONOMATOPOEIA ULULATE  
YWAINETIRESIAS 32343B SCHEHERAZADE ISIS FORE-  
SHEET XIPHODIAN MNEMOSYNE ERRATIC

The text transmitted from WIMK:

TANTALUM UMLAUT AUTUMN MNEMONICS ICH-  
THYOPHAGOUS NICTITATING NTHILISM TRUCRI  
ISEULT TENNESSEEE JEREED ORIENTATE JEQUIR-  
ITY SIESTA ARIES SIMOOM SIRENTAN APPANAGE  
PATENTEE YTTRIA LAITY UDOMETER ERRANT  
VITEBSK ANTEATER AORTA BACCARAT DEIFY COOP-  
ERAGE FANFARONADE TIENTSIN GENRE HAWAIIAN  
QUARTERN KANAKA KAYAK LIGNIN NITER DROHO-  
BYCZ VERISIMILITUDE WAPITI VALLETTA ZACA-  
TECAS 7M3432 LAUTTASARI ENZYME MELLIFLU-  
ENCE BYSSUS VALVULAR FINDESIECLE

# HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (5) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of *QST* are unable to vouch for their integrity or for the grade or character of the products advertised.

**QUARTZ**—Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York.

**RADIO** engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Byrd St., Valparaiso, Ind.

**REPAIRS**: Microphones, meters, broadcasting equipment, electronic devices, instruments. Prompt repair service. Low prices. Estimates on request. Sound Engineering Corp., 2200 Kinzie, Chicago.

**HAM** equipment bought, sold or traded. Distributors of all nationally known ham apparatus. Write for catalogue. Walter Ashe Radio Co., St. Louis, Mo.

**1000W** General Electric transformers, 1100-2200-4400 each side center on 110. Sold hams right years. \$13.50. Dawson, 5740 Woodrow, Detroit.

**REBUILDING** tube—add that million dollar touch, relay racks, Panels, sub-bases, dust covers. Heavy duty power equipment for 100% performance. Edison B batteries, antennas. Rectifier Engineering Service, 4837 Rockwood Rd., Cleveland, O.

**QSLs, SWLs**, real prices. Samples. (Stamps). W8ESN, 1827 Cone, Toledo, Ohio.

**QSLs, SWLs, W6DOU**, Hayward, Calif.

**QSLs. Samples?** W2SN, H. W. Yahnel, Helmetta, N. J.

**CHICAGO** hams! X cut crystals 80 meters within 3-4¢. \$2.35. W9CUK.

**QSLs, SWLs**, 75¢ per hundred, two colors, samples on request. W5ECM, 319 Rosetta, Little Rock, Ark.

**RECEIVERS**—new and used sold and traded in, as Hammarlund, National, Postal, International, etc. Schwarz Radio Service, Dumont, N. J.

**HAMMARLUND** with crystal filter—like new \$80.00. Instructograph with electric motor \$10.00. W9PSW, Harvey, Illinois.

**QSL cards**, two color, cartoons, message blanks, stationery, snappy service. Write for free samples to-day. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

**50 watters**, \$7.50; 203A and 854s, new. Amateur Service, Fairview, N. J.

**CRYSTALS!** Unsurpassed!! Write W8DED.

**QSLs!! SWLs!!** World's Finest!! Samples? (stamp) W8DED, Holland, Michigan.

**Callbooks!** (summer) \$1.25 W8DED.

**CRYSTALS** for one-spot-nets; 80M, \$2. each, lots of 10 @ \$1.50; 40M, \$3.50 each, lots of 10 @ \$3. Vollmer Radio Lab., 6126-35th St., San Diego, Calif.

**CALLBOOKS**—new Summer 1935 Radio Amateur Call Book, hundreds of late W and VE calls, important changes in prefixes, many pages of new DX QRAs, is yours for \$1.25, or one year (four issues) for \$4.00. (In foreign countries \$1.35 and \$4.35, postpaid.) W9FO-610 S. Dearborn, Chicago.

**PATTERSON, RME9D**, Sky rider, McMurdo Silver, Sergeant. Large stock Cardwells, Bliley, Sangamo, Raytheon, Sylvania, Speed-X. Trade in your receiver. Vinson Radio Company. W5VK. 2123 Broadway, Little Rock, Arkansas.

**FOLDER** free, crystals \$1.50-W9DAX, Faberadio, Sandwich, Illinois.

**QSLs!** The largest variety of the finest samples. Free to hams. Also, any other ham printing. W2FJE, 145 Lafayette Avenue, Brooklyn, N. Y.

**FB7A** Complete tubes power supply 20-40 meter coils \$40. W2BRE, 3455 56th St., Woodside, N. Y.

**SALE**—Almost new AC SW-3 tubes, 20, 40, 80 coils \$17. W4CWB.

**TELEPLEXES**, Vihroplexes, Ommigraphs, Meters, Receivers—Bought, sold, traded.

**SELL** Complete 72 Lesson RCA Course—\$15. H. W. Noyes, R2, Aurora, Oregon.

**QSL's** that click! W6FZQ/W6HEU, Box 1804, Phoenix, Arizona.

**FOR Sale**: 5W5 d.c. receiver, Universal double button microphone, monitor, 32 volt dynamotor, Triplet 1176 set tester, and 40 Watt c.w. fone xmitter. W9DLC, Spruce, Mo.

**SWAP**: WE 518-B volume indicator, 17-B line amplifier; rack type. Wanted: sextant, spectroscope, chronometer. A. H. Dreesen, Mansfield Center, Conn.

**CRYSTALS**: Zero cut. Your approximate frequency, 80 or 160 meters \$1.85. Forty meters \$3.95 postpaid. Guaranteed to compensate at near zero without oven control. Plug-in holders 75¢. Fisher Laboratory, 4522 Norwood Street, San Diego, California. "Pioneers of low priced crystals."

**CRYSTALS**—160-80 meters \$1.50. W1HAZ, Pittsfield, Mass. 80, 160 meter crystal controlled phone transmitter complete. Tubes, microphone, crystal, ready to plug into light socket and go \$20.00. Folder—stamp. W8FHI, 5860 Forward, Pittsburgh, Pa.

**TRANSMITTER**: Two '10s push-pull, 150 watts input; Tritet, link coupling, fixed neutralization, antenna network. Bakelite panel, aluminum frame. Good DX record. \$45.00 complete. Hal Justice, W4TS, Canton, North Carolina.

**CONTROL** or Standard Carrier Phone—c.w. Transmitters, any power, any band; also audio and P. A. equipment, to order. Dubilier, Ward Leonard, UTC, Westinghouse parts for sale. Standard Communications Co. W2BNY, 1492 East 12th Street, Brooklyn, New York.

**SEMI-AUTOMATIC** keys, mikestands. Card for photo-descriptions. W2CPQ, 245 Martine, White Plains, N. Y.

**CRYSTALS**—Regularly \$1.95. For June only, \$1.75. 1715-4000. 1". "X". Within two kilocycles. Sensational machined Formica Holders. Genuine "GR" plugs or pins. \$1.00. Catalogue. Ham Crystals, 1104 Lincoln Place, Brooklyn, N. Y.

**AUTOMOBILE** call letter plates. Steel 6" x 12". Colors optional, pair 60¢, W9AIN.

**MILLIAMMETERS**—triple range Jewells. W9SXF, 1237 "C" Street, Lincoln, Nebraska.

**FOR SALE**—Early issues Everyday Engineering, Practical Electronics, Radio Electrical Experimenter, Science and Invention, Radio News, QST, Popular Radio, Radio Digest. Box 424, Decatur, Texas.

**FIVE & two-half meter superhetrodyne**, completely built; \$13.50. Concentric Line transmitters \$10.00 Push-pull \$12.50; Master Universal Exciter transmitter \$32.50; We build to order transmitters, receivers. Precision Radio Laboratories, 109 East 94th Street, Brooklyn, N. Y.

**CRYSTALS** Guaranteed. 160-80 meter, less than 1", x or y, within five kilocycles \$1.35; within two kilocycles, 1" \$1.75. Rough-cut blanks 60¢; oscillating 85¢; odds and ends five for \$1.00. Speedy service. William Threm, W8FN 4021 Davis Avenue, Cheviot, Ohio.

**LEICA** or Contax wanted. Trade New 204A's, 860's, SW-3, Used 212D's, 204A's, transmitting equipment. W5BOW.

**QSLs?** None better. Samples? W8DDS, 2156 West 80th St., Cleveland.

**QSL's** 75¢ a 100, 2 color, W9DGH, 1816 N. 5th Avenue, Minneapolis, Minn.

**EXCELLENT**, slightly used ham equipment. SW3 receiver and power supply, three transmitters, frequency meter, monitor, meters, many other items. Write for list—now. W2EQK, 1934 University Avenue, New York City.

**COMET** Pro—airtuned I.F., 6 prs. coils: first \$50, takes it. Also new ACSW-3 with power pack, 5 prs. coils for \$25.—Fowler, 165 Franklin St., Bloomfield, N. J.

**150 QST's** February 1917 to date incomplete \$20. lot, 25¢ apiece. SW3 a.c.-d.c. tubes fil. trans. 16 coils \$25. Also meters and other parts. Write for list. Arthur Southworth, White Ave., Wakefield, Mass.

**SELL** or trade 5 k.w. screen-grid tube including all accessories. FB for grid modulation. What have you? W9QT.

**W9ADN** Crystals—New high activity types—80—\$1.50; 40—\$3.00.

**QSLs**—Samples. W1AEF, 83 Orange, Roslindale, Mass.

**WANTED:** Rider's Service Manuals and other radio books: State age, condition and price. **WICHB.**

**DYNAMOTORS** 6/400 volts 500 milliamperes \$15. Permanent magnet ribbon mike \$7.50. 845 new \$15. 203A new \$12.50. Photo tubes and transmitting tubes. **W6LSH**, 1975 Navarro Ave., Pasadena, Cal.

**QSLs?** Samples. **Waggoner**, 458 S. 5th Street, Louisville, Ky. **FOR** sale **W9FGX** eighty meter phone transmitter. Four hundred watts. Complete with tubes and racks. Five hundred dollars. Write **Mrs. H. I. Crawford**, Wausau, Wisconsin.

**ESCO** M-G used three months, 110-220 3 HP 3 phase—2000v .5 amp 14v 25 amp. \$235.00 or make offer. **W5EHZ**.

**QSLs** by **Maleco**. Finest in country. Free samples. **Maleco**, 1512 Eastern Parkway, Brooklyn, New York.

**QSLs**. Samples. 2143 Indiana Ave., Columbus, Ohio.

**TRANSMITTER**, Phone-c.w. **WE242A** final. Four stage, aluminum cabinet. Make cash offer. Want telescope rifle sight. **W3AGA**.

**NATIONAL** **FB7XA** latest model, 20, 40, 80, 160 meter bandspread coils, power supply \$52. For **W3ESY**, Hellam, Pennsylvania.

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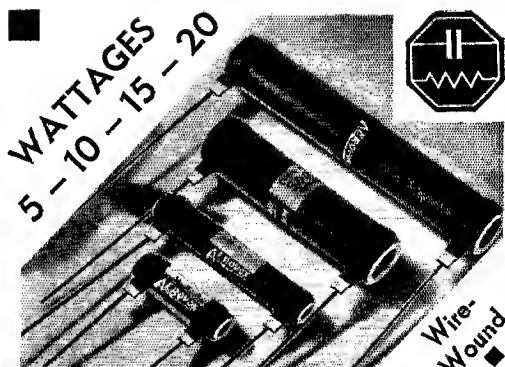
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All Sizes Cut to Order **BAKELITE TUBING & RODS**

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**ACHIEVES GREATER VOLUME AND PERFECT REPRODUCTION without feedback or hum pickup!**

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**AMPERITE 7-POINT Velocity MICROPHONE**

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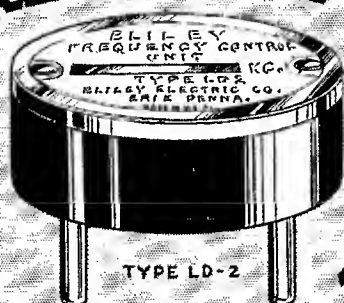
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## For Your Convenience QST'S INDEX TO ADVERTISERS IN THIS ISSUE

Aerovox Corporation	100
American Piezo Supply Co.	76
Amperite Corporation	100
Astatic Microphone Co.	78
A.R.R.L. Application Blank	98
Binder	97
Emblem	93
Handbook	81
Lightning Calculator	75
Log Book	74
Publications	79
Supplies	83
Barr Laboratories	66
Birnbach Radio Company	92
Bliley Electric Company	103
Brach Mfg. Co., L. S.	97
Burgess Battery Company	104
Candler System Company	88
Capitol Radio Engineering Institute	84
Cardwell Mfg. Corp., Allen D.	69
Central Radio Laboratories	70
Cohen's Sons, I. S.	93
Collins Radio Company	Cov.
Communications Products, Inc.	72
Cornell-Dubilier Corp.	96
Eastern Radio Specialty Co.	85
Eby, Inc., Hugh H.	76
Elitel-McCullough, Inc.	78
General Electric Company	87
General Radio Company	89
Gentry Laboratories	96
Gross Radio, Inc.	63
Gulf Radio School	78
Hammarlund Mfg. Company	4
Heintz & Kaufman	77
Henry Radio Shop	100
Hipower Crystal Company	78
Instructograph Company	86
Jappe Company, H.	97
Jellerson Electric Co.	73
Johnson Co., E. F.	85
Kaltman and Romander	68
Leeds	71
Littelfuse Laboratories	97
Lynch, Inc., Arthur H.	96
Mallory & Company, P. R.	67
Marine Radio Company	2, 88
Massachusetts Radio School	82
Mignon Transformer Co.	80
National Company	61, 80, 86, Cov. 3
Offenhach Electric Company	90
Oxford University Press	92
Port Arthur College	97
Precision Piezo Service	82
Premier Crystal Lab.	87
Radio Mfg. Engineers	91
Radio Receptor Corp.	84
Radio Shack	89
Radio Supply Company	97
Radio Transceiver Labs.	96
Raytheon Mfg. Company	82
Raytheon Production Corp.	64
RCA Institutes, Inc.	80
RCA Radiotron Division	Cov. 4
RCA Victor Division	65
Scientific Radio Service	97
Shuler Supply Company	93
Shure Brothers Company	86
Stromberg-Carlson Telephone Mfg. Co.	74
Teleplex Company	76
Triplet Electrical Instrument Co.	62
Turner Company	92
United Electronics Co.	1
United Radio Mfg. Co.	100

# BLILEY Presents

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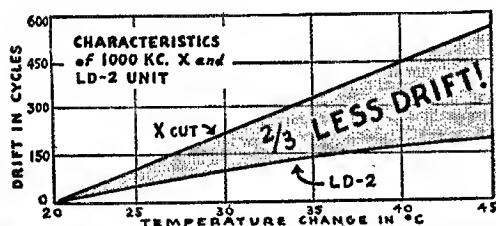
TYPE LD-2

only  
**\$4.80**

With  
**2/3 LESS  
FREQUENCY DRIFT**

### LOOK AT THESE LD-2 FEATURES!

1. Extremely low drift—Less than 8 cycles/megacycle/°C.
2. Greater activity.
3. Choice of 3 bands—40, 80, and 160 meters.
4. Guaranteed Precision—0.03% Accurate in your transmitter.
5. Supplied within 0.1% of your desired frequency, or choice from dealer's stock.
6. Greatly Improved Holder—Permanently Sealed.
7. Extremely Inexpensive—Only \$4.80 at your dealer.



From the Bliley research laboratories comes the Bliley LD-2 Unit—the greatest single development in crystals since their application to radio.

The LD-2 operates with unbelievable efficiency because it is the result of an entirely new manufacturing principle. Frequency drift is guaranteed less than 8 cycles/megacycle/°C. Greatly improved holder construction increases crystal efficiency.

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**BLILEY ELECTRIC CO.**  
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## BURGESS *Announces the* "A" and "B" MIDGET Batteries

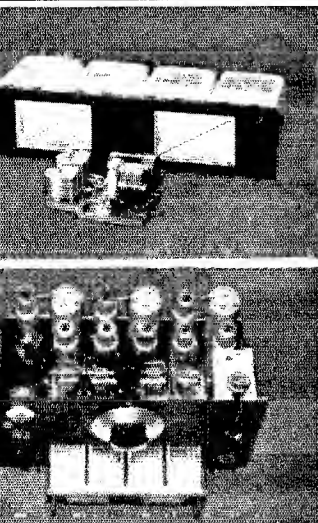
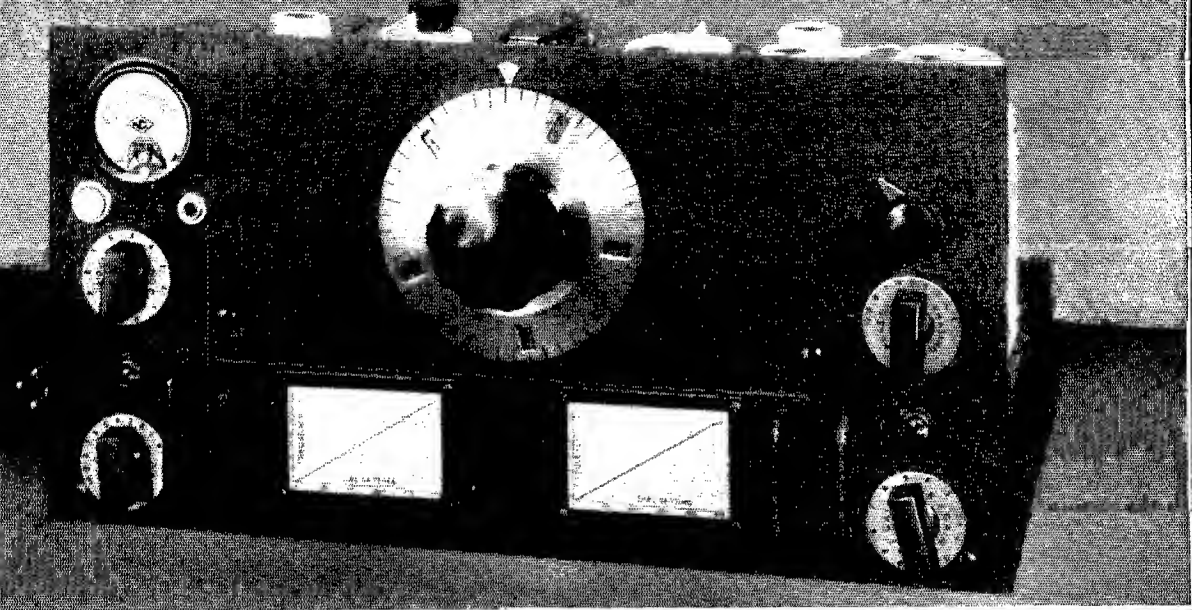
Two new BURGESS Batteries for portable use. Especially for use in portable transceivers! In the photograph above, you see Mr. M. J. Dyrd, BURGESS Sales Engineer, comparing a standard BURGESS "B" with the two new Midgets:

The BURGESS 3-Volt "A" (the smaller battery in Mr. Dyrd's right hand)—only  $1\frac{3}{32}$ " x  $2\frac{1}{8}$ " x  $3\frac{3}{4}$ " and weighs only 8 oz.

The BURGESS 45-Volt "B"—only  $1\frac{5}{16}$ " x  $3\frac{1}{16}$ " x  $4\frac{1}{16}$ " and weighs just 14 oz.—less than an ordinary  $4\frac{1}{2}$ -Volt "C" battery—but it will give 22 hours of intermittent service. Rated capacity—13 watt-hours.

Use these new BURGESS Midgets in your portable transceivers. They are recommended for Amateur Clubs, Hospitals, Radio Stations, Construction Gangs—for any users of portable transmitters or receivers. They are Midget in size and weight, but they deliver a POWERFUL, even current. Chalk up two more "FIRSTS" for BURGESS Engineers! BURGESS BATTERY CO., Freeport, Ill.

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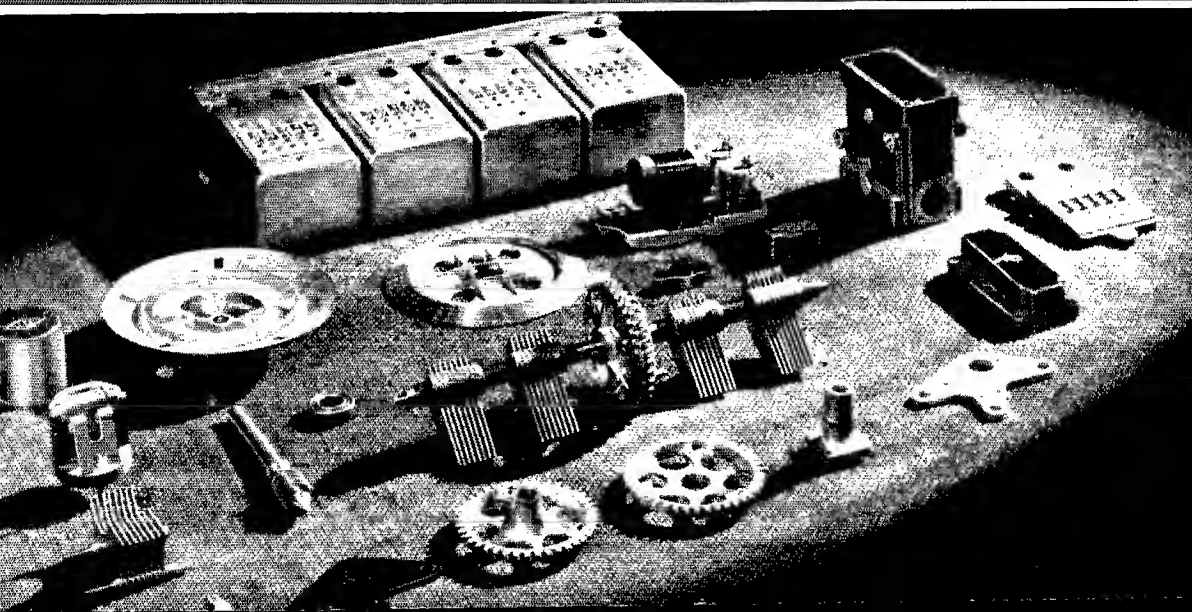
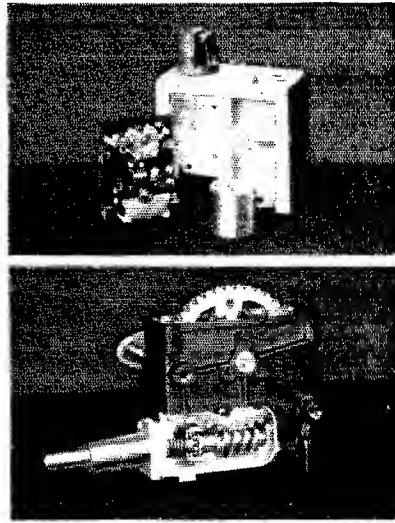


## THE HRO

A few of the 59 air-dielectric condensers that make each HRO drift free are illustrated on this page, plus a few of the moldings that contribute to its efficiency, and a few of the machinings that lend it precision.

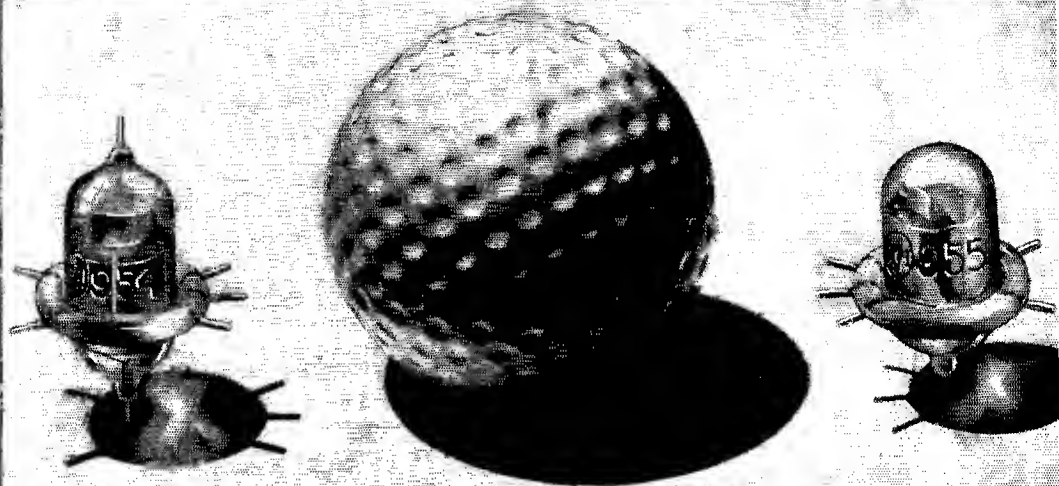
It is as unique in construction as in performance. Look it over at your dealers.

National  Company



# ANNOUNCING THE ACORN-TYPE PENTODE

## NEW RCA-954 OFFERS GAINS OF 10 OR MORE AT 3 METERS



**T**HIS new companion to the RCA-955 triode makes it possible for the amateur and experimenter to design and construct ultra-high frequency circuits embodying the well-known pentode advantages of stability plus high gain. The new RCA-954 Pentode is similar in size and general appearance to the original acorn tube, except for the addition of the plate and No. 1 grid connections at either end of the tiny bulb.

Experiments show that the RCA-954 can be worked as low

as 0.7 meter, and that at 1 meter gains of three or more are practical with conventional r-f pentode circuits. Higher gains are, of course, obtainable at lower frequencies. The RCA-954 is also valuable for use in portable apparatus where compactness is desirable, and in vacuum tube voltmeter circuits for high frequencies. Now available through RCA deForest distributors at amateur's net price of \$5.80 including connecting clips. For complete technical data, write to



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